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A

GRAMMAR OF BOTANY,

ILLUSTRATIVE OF

ARTIFICIAL, AS WELL AS NATURAL,

CLASSIFICATION,

WITH AN EXPLANATION OF

JUSSIEU'S SYSTEM.

BY

SIR JAMES EDWARD SMITH, M.D. F.R.S.

&c. &c.

PRESIDENT OF THE LINNÆAN SOCIETY.

Natural Orders instruct us in the nature of plants; artificial ones teach us to know one plant from another. *Linn. Gen. Pl. ad Ord. Nat.*

London:

PRINTED FOR LONGMAN, HURST, REES, ORME, AND BROWN,

PATERNOSTER-ROW.

1821.

BODLEIAN
28 MAR 1940
LIBRARY

Printed by Richard and Arthur Taylor, Shoe Lane, London.

TO

MRS. CORRIE,

OF WOODVILLE LODGE, NEAR BIRMINGHAM,

THE AUTHOR DEDICATES THIS WORK;

AS A SINCERE TESTIMONY

OF ESTEEM AND RESPECT,

FOR THOSE EMINENT, THOUGH UNOBTRUSIVE,

VIRTUES AND TALENTS,

WITH WHICH,

BUT FOR THE SCIENCE OF BOTANY,

HE MIGHT NEVER HAVE HAD THE HAPPINESS

OF BECOMING ACQUAINTED.

Norwich, Sept. 27, 1820.

PREFACE.

THE intention of the present volume is not only to supply some deficiencies, in a work of the same author, entitled *An Introduction to Physiological and Systematical Botany;* but also to follow up its design, by additional information; especially on the subject of the natural classification, or affinities, of plants. The reception of that elementary treatise has been such, as to make it incumbent on the author to neglect no opportunity of being further useful. Yet he has not thought proper to add any new matter to the successive editions of his book, which the possessors of the original might not obtain in a separate form. The fourth edition, which, besides an American one, is now before the publick, has therefore merely received such emendations and corrections as were necessary to prevent mistakes.

The popularity and success of the former work have, as usual, called forth many labourers into the same field. Some of these, though borrowing from it with unsparing hands, have thought proper to vary the form of their instructions; partly perhaps to conceal that want of originality, which generally enfeebles all compilations; and partly to tempt weak or sickly appetites, which have no previous taste for the invigorating food of real knowledge. It is a commendable intention to lure such triflers, by tales or dialogues, to more solid reading, and more efficient instruction. I mean not to discommend or undervalue any of these humble attempts; but the subject must not be reduced to their level. The only radical fault in compilers, especially of elementary scientific instruction, is their inability to appreciate what is most important to teach or to enforce. Hence they encumber themselves, and alarm beginners, with loads of unmeaning names, and of useless, or discarded, terms. Let such be found in their proper places, but not obtruded on the student where they can render him no service. The elements of every science are necessarily dry enough; but when they are correct and clear, they charm by their precision; a taste for which quality is one of the great advantages to be derived by the youthful mind, from the study of nature.

With these considerations in view, I have commenced the present volume with what may be termed a Botanical Grammar. In the first five chapters the parts of the vegetable body, and their uses, are defined in a concise and methodical manner, with none but important technical terms. Perhaps the contents of these chapters might, with advantage, be learned by heart; the young scholar being directed to seek out examples, of each particular part, or character, as he proceeds, from the garden or fields. The more ample *Introduction to Botany* would furnish his tutor with references to every example in books, that could possibly be wanted; and the pupil might gradually be led on to a wider circle of terminology, (especially with regard to leaves,) necessary to be known before the *species* of plants can be investigated in detail. If the contents of these five chapters be well stored up in the mind, and the meaning of all the terms, therein explained, clearly and distinctly impressed upon the memory, the student will be competent to read any book, or to examine any flower, with great advantage. He will find himself so well grounded, that every thing will subsequently be of very easy attainment, and he will soon be conscious of a great superiority over those who read, or observe, in a desultory way; possibly over many who write, or attempt to teach, without such a foundation. Nor will it be difficult for any attentive scholar, even without a master, to acquire these necessary principles. The paragraphs are numbered, and refer to each other where mutual illustration is requisite. The figures also are occasionally cited, and may be consulted throughout; though principally intended to explain the systematic part of the work, hereafter mentioned.

The theory of Systematic Arrangement, in the sixth chapter, should likewise be well fixed in the mind. This subject is here treated in the same compendious way as the former; with all that is essential, as a foundation for any degree of further inquiry.

The student being thus furnished with a knowledge of the materials with which he has to work, and the relative importance of those materials for each particular purpose, will easily comprehend the principles of the Linnæan Artificial System, which claims his attention in the seventh chapter. This, he will soon perceive, is to be understood merely as a dictionary, to enable him to make out any plant that may fall in his way. He will learn to reduce such plant to it's proper class and order, in some systematic work, where he will trace out in progression it's genus and species, with every thing that any author has recorded of it's history or use. A complete set of original figures, explanatory of this artificial system, is here subjoined, the want of such, in the above-mentioned *Introduction to Botany*, having been complained of. The chapter in question, after a few remarks on nomenclature and generic characters, closes with a detailed exposition of the principles and intention of the Linnæan definitions of species. Some of these rules have hitherto been applied to Latin composition only; but it does not appear that they may not be kept in view, though less strictly, in any language; and the laws of discrimination and definition are absolute in themselves.

Thus far only have the pupils of Linnæus been accustomed to go. But it is the object of the present publication to enable them to proceed a little further. The English reader is here, for the first time, presented with a full explanation of the System of Jussieu. The subject of the natural affinities of Plants, and the question of classing them according to characters derived from thence, have, within a short time, excited the attention of British Botanists, after being still more canvassed and taught on the continent. This subject was originally called into notice by Linnæus himself, he having first pointed out the difference between a natural and an artificial arrangement. Natural affinities cannot now be overlooked, by those who contemplate the Vegetable Kingdom with any degree of philosophical attention. As Professor de Jussieu and his pupils take the lead in the department of natural classification; the botanists of England, who have never been behind their neighbours, in real science, may well desire to know something of the principles or advantages of a system, which deservedly claims so much notice. I have the more readily undertaken this task of explanation, as I propose to advert more fully, than has hitherto been attempted, to the subject of natural affinities, in my intended Flora, which has so long been promised to the British reader, in his own language. A work of this kind, founded on actual observation, is indeed requisite, instead of the various compilations of compilations, with which those who cannot read Latin have hitherto been obliged to rest satisfied. Some exposition of this kind must have accompanied that work, to render it intelligible; and it will be still more commodious for the student to become previously initiated, and to take a general view of the subject, before his attention can be directed to particulars.

The eighth chapter begins with an index, or key, to Jussieu's Classes, and an enumeration of his Orders. In the sequel each Order is given in it's place, with the full character, translated from the *Genera Plantarum* of Jussieu. His descriptions and observations are every where marked by inverted commas, occasional corrections or remarks, intermixed with his text, being inclosed between brackets. The characters of some Orders in the 1st Class, better understood, since he wrote, as the *Musci* and *Filices*, are totally reformed. To his definitions of a few others, given in his own words, are subjoined more complete and correct accounts, founded on more recent inquiries, as is particularly the case with the 20th, 21st, 26th, and 47th Orders. The establishment of new Orders, either by himself or other botanists of eminence, since his book came out, is indicated under the original Order from which each new one has been separated. The aim of the present work however is not, by any means, to give a full view of these. As nothing is more easy than subdivision in such studies, it is no wonder that the followers of Jussieu should often carry that principle too far; just as young botanists are prone to multiply genera. The talents for judicious combination are infinitely more rare. We must wait therefore till some of these innovations shall receive confirmation from superior authorities, as well as from long experience. My present design is rather to exemplify the original System of Jussieu; to point out it's merits and defects; to mark the genuine, as well as doubtful, Genera of most Orders, and to give examples of all, with such observations, sparingly introduced, as may serve to throw light upon the subject. Many of the Genera for which Jussieu could not find a place in his System, being now better known, are here referred to their proper Orders. After all, the reader must not consider this publication as any thing like a complete view of a Natural System, but rather, to use a French idea, as *Memoirs towards a System.* Much still remains to be done by future observers, and still more by future systematic writers. It is evident that no such mode of classification can, at present, serve the purposes of analytical investigation, to make out an unknown plant. That is the exclusive object of the Artificial System of Linnæus, which, of all the schemes hitherto contrived, is alone, perhaps, universally applicable to the end in question. A tacit conviction of this truth seems to be the source of great enmity, in many of the disciples of Jussieu, towards that System, which aims no hostility or rivalship against them. A dictionary quarrels not with a grammar, nor a history with a chronological table. It is pernicious, as well as foolish, to set them at variance.

The plates, composed in the first instance to explain the Artificial System of Linnæus, have been extended much further, in order to afford representations of one or more Genera in each of Jussieu's Orders, or subdivisions of Orders. The figures, numbered in regular succession throughout, are cited in the text, and a full explanation of the whole is separately given. The volume ends with a comparison between the Linnæan Natural Orders, and those of Jussieu, by which it will be seen how nearly the conceptions of these great men, though not derived from the same principles, agree together. A few speculative remarks close the whole. They may teach the reader to think on the subject, and to judge for himself hereafter, how far the conjectures or conclusions, interspersed through the preceding review of Jussieu's Orders, are well founded.

EXPLANATION OF THE PLATES.

TAB. 1. *fig.* 1. *Globba racemosa.* *a.* Calyx. *b.* Tube of the Corolla. *c, c, c.* Outer limb. *d, d.* Two segments of the inner limb. *e.* Third segment of the same, or lip. *f.* Filament. *g.* Anther. *h.* Style. *i.* Germen. *k.* Stigma.—2. *Veronica spicata.*—3. *Poa fluitans*, magnified. 4. A floret more magnified.—5, 6, 7. *Scabiosa arvensis.*—8, 9. *Epacris obtusifolia.*—10, 11. *Galanthus nivalis.* *a.* Spatha.—12. *Aesculus Hippocastanum.*—13. *Daphne collina.*—14. *Butomus umbellatus.*—15, 16. *Dianthus cæsius.*—17. *Reseda lutea.* *a.* Two upper petals, magnified. *b, b.* Two middle ones. c. Two lowermost. *d.* Nectary.—18, 19. *Mespilus grandiflora, Exot. Bot. t.* 18.

TAB. 2. *fig.* 20. *Capparis spinosa.* *a.* Germen, on a long stalk.—21. Corolla, stamens and style of *Lamium album.* 22. Calyx and seeds of the same.—23. Stamens, pistil, and 1 petal, of *Thlaspi Bursa-pastoris.* 24. Calyx-leaf and pouch.—25. *Teesdalia nudicaulis, Compend. Fl. Br.* 98. 26. Stamens and pistil magnified. 27. A stamen, with it's scale.—28. Calyx and 1 petal of *Cardamine amara.* 29. Stamens and pistil. 30. Ripe pod and seeds.—31. Stamens of *Geranium sylvaticum.* 32. Calyx. 33. A Petal. 34. Pistil. 35. Capsule and it's beak.—36. Calyx of *Althea officinalis.* 37. Petals, stamens, &c. *a.* Pistil.—38. *Fumaria solida.* 39. Stamens, in two sets, with the pistil.—40. *Spartium scoparium* stripped of it's petals.

TAB. 3. *fig.* 41. Stamens and pistil of *Ulex europaeus.*—42. Stamens and style of *Pisum maritimum.* 43. Calyx of the same. 44. Standard. 45. A Wing. 46. One petal of the keel. 47. Pistil.—48. Stamens and pistil of *Hypericum elodes.* 49. Calyx magnified. 50. Back of the whole flower.—51. *Stuartia pentagyna.* 52. A petal separate, with part of the stamens. *a.* Pistils.—53. *Melaleuca thymifolia.* 54. Bundles of stamens. 55. Calyx and pistil. 56. Separate petal.

TAB. 4. *fig.* 57. *Picris echioides.* 58. Calyx and receptacle of the same. 59. Floret. 60. Seed and it's down.—61. *Carduus nutans.* 62. Section of the receptacle, with the young seeds, down, &c. 63. Floret.—64. Floret of the radius of *Centaurea Cyanus.* 65. Floret of the disk of the same.—66. *Inula dysenterica.* 67. One of it's radiant florets. 68. One of those of the disk, with (*a*) the anthers and stigma separate. 69. Receptacle. *a.* A portion magnified.—70. *Ophrys apifera.* *a, a, a.* Calyx-leaves. *b, b.* Petals. *c.* Lip of the nectary. *d.* A stalked mass of pollen, projecting from one of the cells of the anther. *e. f.* Base of the column, in front of which is the stigma. 72. Mass of pollen separate. *g.* Its glandular, or viscid, base.—73. *Stylidium graminifolium, Br. Prodr.* 568. 74. Germen, calyx, and column, magnified 75, 76 Anthers, with the stigma between them.—77. *Dendrobium linguiforme.* *a.* Lid of the Anther. 78. The same stripped of it's calyx and petals. *a.* Lid. *b.* Column. *c, c.* Stigma. *d.* Germen. *e.* Anther stripped of it's lid.

Tab. 5. *fig.* 79. Barren and fertile flowers of *Carex pulicaris.* *a.* Germen and style separate. *b.* Ripe fruit.—80. *Quercus Robur.* 81. Barren flowers magnified. *a.* Stamen and it's corresponding scale. 82. Fertile flowers magnified. 83. One of them after impregnation. 84. Acorn and it's cup.—85. *Salix herbacea,* barren plant. 86. One of it's flowers magnified. 87. Fertile plant of the same. *a.* A flower magnified. *b.* Nectary.

Tab. 6. *fig.* 88. *Populus alba,* catkin of barren flowers. 89. A flower, with it's scale, magnified. 90. Fertile flowers. 91. One of them magnified.—92. *Ficus Carica.* 93. Section of the same, showing the flowers. 94. Perfect flower. 95. Fertile one.

Tab. 7. *fig.* 96. *Equisetum sylvaticum.* 97. One of it's peltate scales. 98. Germen, and four supposed stamens.—99. *Aspidium Filix mas.* 100. A lobe magnified. 101. Capsule burst.—102. *Scolopendrium vulgare.* 103. A portion magnified. 104. Capsules.—105. *Dicranum purpureum.* 106. It's scaly sheath. 107. Ripe capsule and lid. 108. The same deprived of it's lid, showing the fringe.—109. *Hookeria lucens.* 110. Scaly sheaths. 111. Capsule entire. 112. Portions of the outer and inner fringe, greatly magnified. 113. Veil.—114. *Jungermannia multifida.* 115. Capsule in various states.

Tab. 8. *fig.* 116. *Opegrapha scripta.* 117. Fructification enlarged.—118, 119. *Parmelia murorum, Ach. Syn.* 181. 120. A fragment magnified.—121. *Peltidea canina, Ach. Syn.* 239. 122. A powdery-edged portion.—123. *Fucus natans.* 124. Fructification, and swimming bladder, magnified. 125. Section of a seed-vessel, more enlarged. *a.* Seed with it's mucus. 126. Cavity in the frond, bearing tufts of fibres, *a.*

Tab. 9. *fig.* 127. *Conferva corallina.* 128. Magnified portions of the same.—129. *Agaricus muscarius* diminished. *a.* *Volva.* *b.* Fleshy *Volva.* —130. *Peziza coccinea.*—131. *Peziza stercoraria.* 132. Sheaths or cells greatly magnified, lodging the seeds.—133. *Aecidium fuscum.* *a, a.* The same greatly magnified.—134. *Aponogeton monostachyon.* *a.* Flower magnified. *b.* One of the germens more enlarged.

Tab. 10. *fig.* 135. *Potamogeton crispum.* *a.* Flower magnified. *b.* One of the pistils.—136. *Lemna trisulca.* *a.* Flower.—137. *Acorus gramineus.* *a.* Flower.—138. *Typha latifolia.* *a.* Stamens. *b.* Styles.—139. *Carex de-*

pauperata. *a*. Barren flower. *b*. Fruit. *c*. Scale. *d*. Seed.—140. *Scirpus fluitans*. *a*. Scale. *b*. Stamens and pistil.—141. *Coix Lachryma*. *a*. Barren flowers. *b*. Fertile ones.

Tab. 11. *fig*. 142. *Phœnix farinifera, Roxb. Corom. v.* 1. *t*. 74. *a*. Barren flower. *b, b*. Fertile ones.—143. *Paris quadrifolia*. *a*. Calyx. *b*. Petal.—144. *Convallaria majalis*. *a*. Corolla expanded, to show the stamens. *b*. Pistil. c. Half-ripe berry.—145. *Juncus Forsteri, Fl. Brit*. *a*. Flower magnified. *b*. Ripe capsule bursting. *c*. Seed.—146. *Tulipa sylvestris*. *a*. Pistil.—147. *Agave lurida*. *a*. Germen, style, and stigma.

Tab. 12. *fig*. 148. *Blandfordia nobilis, Sm. Exot. Bot*. 5. *t*. 4. *a*. Flower split open. *b*. Capsule also laid open. *c*. Seed —149. *Sowerbæa juncea*. *a*. Stamens and pistil. *b*. Pistil alone *c*. Capsule cut across. *d*. Seed.—150. *Narcissus biflorus*. *a*. Pistil. *b*. *Spatha*, or Sheath.—151. *Sisyrinchium striatum*. *a*. Stamens and Pistil.—152. *Iris fœtidissima*. *a*. Stamens and Stigmas.—153. *Dilatris corymbosa*.

Tab. 13. *fig*. 154. *Strelitzia reginæ*. *a*. Spatha. *b*. Petals. *c, c*. Nectary cut open to show the stamens and style.—155. Seed of *Urania, Schreb. Gen*. with it's blue tunic.—156. *Hydrocharis Morsus-ranæ*. *a*. Stamens. *b*. Calyx.—157. *Asarum europæum*. *a*. Section of the flower. *b*. a stamen. *c*. Stigma. *d*. Seed —158. *Thesium linophyllum*. *a*. Flower somewhat magnified. *b*. Fruit.—159. *Protea rosacea*.—160. *Embothrium buxifolium*. *a, a*. Stigma. *b*. Anthers.—161. *Laurus nobilis*. *a*. Drupa.—162. *Polygonum Bistorta*. *a*. Back of the flower. *b*. Pistil.—163. *Atriplex portulacoides*. *a*. Barren flower. *b*. Perfect flower. *c*. Its pistil.—164. *Achyranthes argentea*. *a*. Fringed segments of the Nectary.—165. *Amaranthus Blitum*. *a*. Barren flower. *b*. Fertile one.—166. *Plantago lanceolata*. *a*. Pistil.

Tab. 14. *fig*. 167. *Mirabilis longiflora*. *a*. Perianth. *b*. Longitudinal section of the seed.—168. *Statice reticulata*. *a*. Petal and stamen enlarged. *b*. Pistil. *c*. Calyx of the fruit.—169. *Anagallis tenella*. *a*. Ripe capsule bursting, with the seeds.—170. *Utricularia vulgaris*. *a*. Calyx and pistil. *b*. Corolla separate, the letter marking it's base, or point of attachment. *c*. Stamens.—171. *Bartsia viscosa*. *a*. Calyx and style. *b*. Corolla and stamens.—172. *Justicia coccinea*. *a*. Pistil.—173. *Olea europæa*. *a*. Calyx and pistil enlarged. *b*. Drupa.—174. *Verbena officinalis*. *a*. Corolla. *b*. Stamens.—175. *Antirrhinum Cymbalaria*. *a*. Corolla forced open to show the stamens. *b*. Pistil. *c*. Ripe capsule burst. *d*. Seed.—176. *Sibthorpia europæa*, magnified. *a*. Calyx and pistil.—177. *Solanum stelligerum*. *a*. Lids of the anther. *b*. Berry, and permanent calyx —178. *Lithospermum purpuro-cæruleum*. *a*. Corolla split open, bearing the stamens.—179. *Convolvulus arvensis*. *a*. Calyx and pistil.—180. *Ipomopsis elegans*. *a*. Calyx and pistil.

TAB. 15. *fig.* 181. *Bignonia undulata*, *Exot. Bot. t.* 19, showing it's fifth filament, which has no anther.—182. *Gentiana verna.* *a.* Pistil.—183. *Exacum filiforme.* *a.* Corolla laid open, with the stamens. *b.* Pistil.—184. *Menyanthes nymphæoides; Villarsia* of Ventenat. *a.* Calyx and pistil.—185. *Pergularia odoratissima.* *a.* Calyx. *b.* Corolla laid open. *c.* One of the five leaves of the crown, with it's internal appendage. *d, d.* A stamen seen externally, and internally, with the anther, and double masses of pollen. *e.* Pistil, with the masses of pollen deposited upon it. *f.* Double germen, surrounded by nectariferous glands of the receptacle.—186. *Vinca major.* *a.* Tube of the corolla, bearing the stamens. *b.* A stamen magnified. *c.* Pistil, of the natural size. *d.* Follicle and seeds.

TAB. 16 *fig.* 187. *Bassia latifolia*, *Roxb. Corom. v.* 1. *t.* 19. *a.* Corolla laid open, bearing the stamens. *b.* Pistil. *c.* Germen swelling, and calyx. *d.* Fruit.—188. *Myrsine retusa.* *a.* Flower magnified. *b.* Pistil.—189. *Diospyros melanoxylon*, *Roxb. Corom. t.* 49. *a.* Stamens and pistil. *b.* Fruit.—190. *Rhododendrum arboreum*, *Sm. Exot. Bot. t.* 6. *a.* Stamen. *b.* Pistil.—191. *Erica Tetralix.* *a.* Stamens and pistil. *b.* Stamen enlarged. *c.* Pistil.—192. *Vaccinium Oxycoccus.* *a.* Stamen enlarged. *b.* Germen half ripe, with the style. *c.* Transverse section of the same.—193. *Campanula Trachelium.*—194. *Scævola hispida*, *Brown Prodr.* 586. *a*, Stamen. *b.* Anther magnified. *c.* Style and stigma.—195. *Lobelia Dortmanna.* *a.* Corolla. *b.* Stamens, with combined anthers. *c.* Calyx and pistil.—196. *Sherardia arvensis*, thrice the natural size.—197. *Cinchona officinalis.* *a.* Corolla laid open, showing the stamens. *b.* Pistil.—198. *Coffea arabica.* *a.* Perianth crowning the germen. *b.* Berry unripe. *c.* Section of the same, showing the tunic of the seed. *d.* Embryo separate.—199. *Hamellia patens.* *a.* Stipulas. *b.* Corolla laid open, showing the stamens. *c.* Calyx and pistil.—200. *Linnæa borealis.* *a.* Corolla laid open, bearing the stamens. *b.* Double calyx, and pistil.—201. *Viburnum Opulus.* *a.* Corolla and stamens. *b.* Calyx and pistil, magnified. *c.* Berry.—202. *Panax quinquefolium.* *a.* Germen, calyx and styles.

TAB. 17. *fig.* 203. *Peucedanum officinale.* *a.* Seeds, each supported by it's proper capillary stalk.—204. *Artedia squamata.* *a.* Flower of the circumference. *b.* Seed.—205. *Eriocalia minor*, *Exot. Bot. t.* 79; see *f.* 209.—206. *Astrantia minor*, magnified. *a.* Barren Flower, with a leaf of the involucrum. *b.* Perfect flower. *c.* Fruit.—207. *Smyrnium Olusatrum.* *a.* Pistil. *b.* Germen cut across. *c.* Fruit.—208. *Caucalis latifolia.* *a.* Flower of the circumference. *b.* Pistil and calyx.—209. *Eriocalia minor*, magnified, *Exot. Bot. t.* 79. *a.* Germen much enlarged, cut across.—210. *Scandix Pecten-Veneris.* *a.* Seeds nearly ripe.—211. *Sison Amomum.* *a.* Half-ripe fruit.—212. *Eryngium campestre.* *a.* Petal. *b.* Styles.—

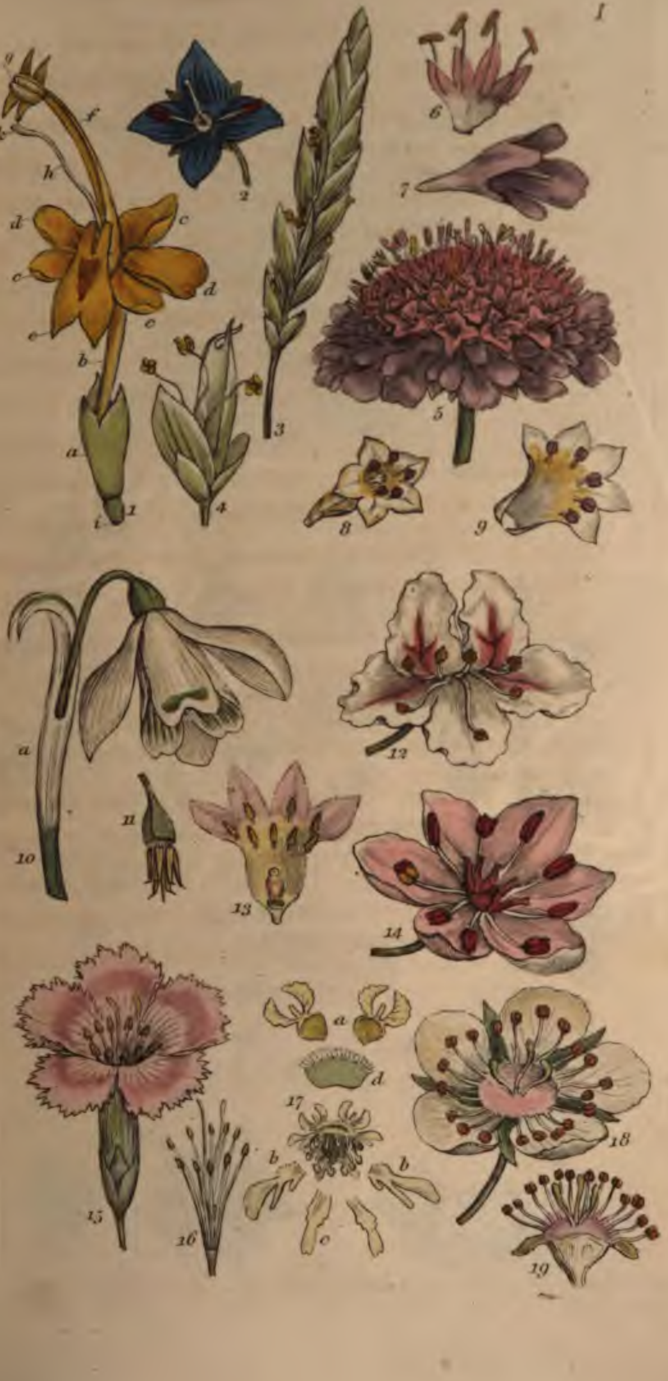
213. *Clematis Vitalba.* *a.* Stamen. *b, b.* Pistils. *c.* Ripe seed, with its feathery tail.—214. *Ranunculus parviflorus.* *a.* Seed.—215. *Helleborus viridis.* *a.* Capsules half ripe.—216. *Caltha radicans.* *a.* Petal. *b.* Stamen.—217. *Actæa spicata.* *a.* Calyx-leaf. *b.* Petal. *c.* Stamen. *d.* Pistil.—218. *Papaver Argemone.* *a.* Petal. *b.* Stamen. *c.* Pistil.—219. *Nuphar minima.* *a.* Petal. *b.* Stigma.—220. *Sapindus rubiginosa, Roxb. Corom. v.* 1. *t.* 62. *a.* Pistil. *b.* Fruit cut across.

TAB. 18. *fig.* 221. *Acer campestre.* *a.* Perfect flower. *b.* Fertile flower. *c.* Fruit.—222. *Malpighia glandulosa.* *a.* Flower. *b.* Fruit.—223. *Xanthochymus pictorius, Roxb.*, showing the five sets of stamens, with five intermediate nectaries.—224. *Citrus Aurantium.* *a.* Young berry.—225. *Turræa virens.* *a.* Pistil. *b.* Capsule. *c.* Seed.—226. *Vitis vinifera.* *a.* Combined petals, elevated by the stamens.—227. *Pelargonium crithmifolium.* *a.* Pistil.—228. *Tropæolum peregrinum.* *a.* Stamen. *b.* Pistil.—229. *Magnolia fuscata.*—230. *Dillenia aurea, Exot. Bot. t.* 92, the pistil and stamens. 231. Portion of the ripe fruit of the same, being an assemblage of succulent-coated capsules.—232. *Uvaria suberosa, Roxb. Corom. v.* 1. *t.* 34. *a.* Calyx and petals. *b.* Receptacle. *c.* Germen cut across.—233. *Menispermum cordifolium, Willd.* *a.* Barren flower in front. *b.* Back of the same. *c.* Ripe drupa. *d.* Section of the same.—234. *Epimedium alpinum.* *a.* Stamen. *b.* The same, with the anther burst, *c.* Pistil. *d.* Calyx. *e.* Nectary.

TAB. 19. *fig.* 235. *Tilia europæa.* *a.* Capsule.—236. *Cistus Helianthemum.* *a.* Calyx. *b.* Stamen. *c.* Pistil.—237. *Boronia serrulata.* 238. Dissection of the same *Boronia.* *a.* Flower stripped of it's petals. *b, b.* Pistil. *c.* Stamen, showing the crested appendage of the anther. *d.* Ripe capsule, after the seeds are gone. *e.* Elastic tunic. *f.* Seed.—239. *Holosteum umbellatum.* *a.* Calyx and ripe capsule. *b.* Receptacle of the seeds.—240. *Stellaria holostea.*—241. *Frankenia lævis.* *a.* Stamens and pistil. *b.* Pistil magnified.—242. *Sempervivum tectorum.*—243. *Saxifraga granulata.*—244. *Ceratopetalum gummiferum.* *a.* Petal and stamen. *b.* Stamen magnified. *c.* Capsule and seed.—245. *Ribes nigrum.* *a.* Calyx laid open, bearing the petals and stamens. *b.* Pistil. *c.* Ripe berry.—246. *Cactus Tuna*, showing the germen, and under side of the flower.—247. *Montia fontana.* *a.* Pistil. *b.* Capsule. *c.* Seed.—248. *Mesembryanthemum tenuifolium.* *a.* Calyx and pistil. *b.* Petals in three rows, with some of the stamens.—249. *Epilobium tetragonum.* *a.* Calyx, with stamens, style, and stigma, all magnified. *b.* Capsule and seeds.—250. *Fuchsia coccinea.* *a.* Berry.—251. *Myriophyllum spicatum.* *a.* Barren flower, with its bractea. *b.* Calyx and stamens of the same. *c.* Fertile flower and its bractea.—252. *Hippuris vulgaris.* *a.* Flower in an early state, magnified. *b.* The same after the pollen is discharged.—253. *Eucalyptus robusta.* *a.* Calyx and pistil. *b.* A stamen enlarged. *c.* Lid lifted off.

Tab. 20. *fig.* 254. *Blakea trinervis.* *a.* Stamens. *b*, *b.* Some of the same separate. *c.* Outer and inner calyx, with the pistil.—255. *Lythrum Salicaria.* *a.* Calyx and style. *b.* Petals and stamens, showing their insertion into the calyx. *c.* Pistil separate.—256. *Rosa spinosissima.* 257. Fruit of the same. *a.* Seed.—258. *Sibbaldia procumbens.* *a.* Back of the calyx. *b.* Petal. *c.* Stamen. *d.* One of the Pistils.—259. *Fragaria vesca.* *a.* Ripe fruit.—260. *Spiræa Filipendula.* *a.* Petal. *b.* Stamen. *c.* One of the pistils.—261. *Prunus Cerasus.* *a.* Drupa.—262. *Viminaria denudata.* *a.* Stamens, all distinct. *b.* Pistil. *c.* Legume, and permanent calyx.—263. *Astragalus hypoglottis.* *a.* Stamens and pistil. *b.* Legume. *c.* Seed.—264. *Semccarpus Anacardium.* *a.* Barren flower. *b.* Perfect one.

Tab. 21. *fig.* 265. *Euonymus curopæus.* *a.* Ripe capsule. *b.* Tunic cut across to show the seed. *c.* Seed naked.—266. *Rhamnus catharticus.* *a.* Segment of the limb of the calyx. *b.* Petal and abortive stamen. *c.* Pistil of a fertile flower. *d.* Rudiment of pistil in a barren one. *e.* Berry.—267. *Lasiopctalum ferrugineum.* *a.* Pistil enlarged, with the petals. *b.* Stamen.—268. *Euphorbia hiberna*, magnified, showing the joints of the stamens, where, according to Mr. Brown, those parts unite with their partial stalks.—269. Pistil of *Buxus sempervirens.* *a.* Transverse section of the germen.—270. *Bryonia dioica.* *a.* Barren flower. *b.* Berry.—271. *Passiflora suberosa.* *a.* Ripe berry, with the permanent calyx and styles. *b.* Seed.—272. *Dorstenia cordifolia.* *a.* Part of the receptacle magnified, with barren and fertile flowers.—273. *Urtica urens.* *a.* Barren flower, with it's central nectary. *b.* Calyx in fruit. *c.* Seed.—274. *Humulus Lupulus.* *a.* Barren flower. *b.* Stamen magnified. *c.* Fertile flower. *d.* Pistil with the tunic, magnified.—275. *Taxus baccata.* *a.* Barren flower. *b.* Fertile flower. *c.* Ripe fruit.—276. *Pinus sylvestris.* *a.* Anther magnified. *b.* Scale of an unripe cone, the natural size. *c.* Ripe seed.—277. *Dacrydium cupressinum*, from Lambert's *Pinus*, tab. 41. *a.* Tip of a branch, with the solitary fertile flower. *b.* Scale of a barren flower, with the double anther, magnified.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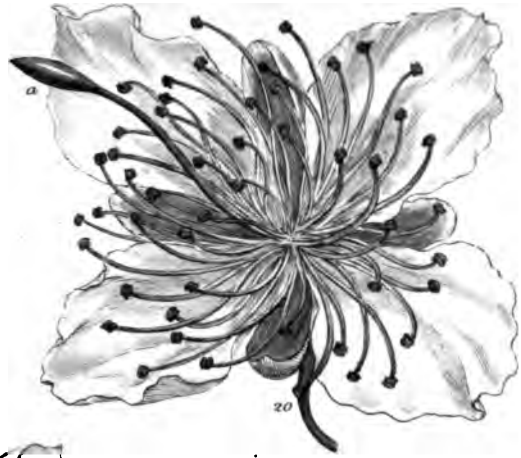

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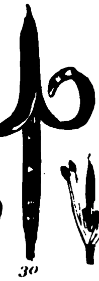
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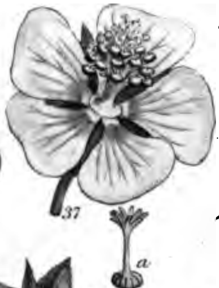

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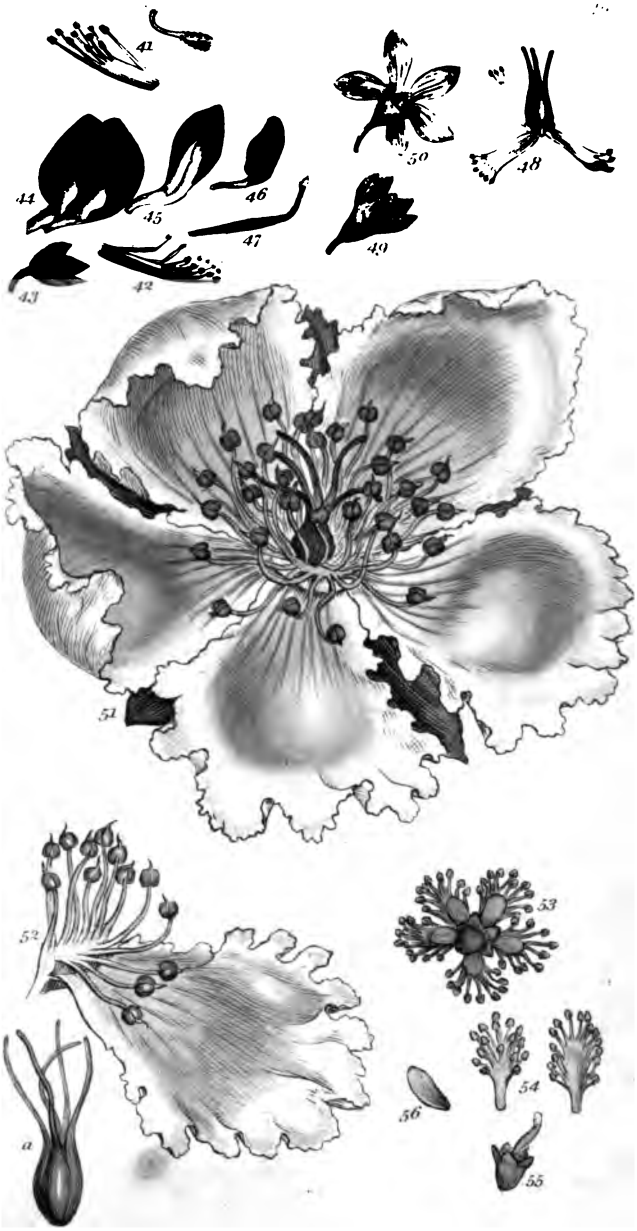
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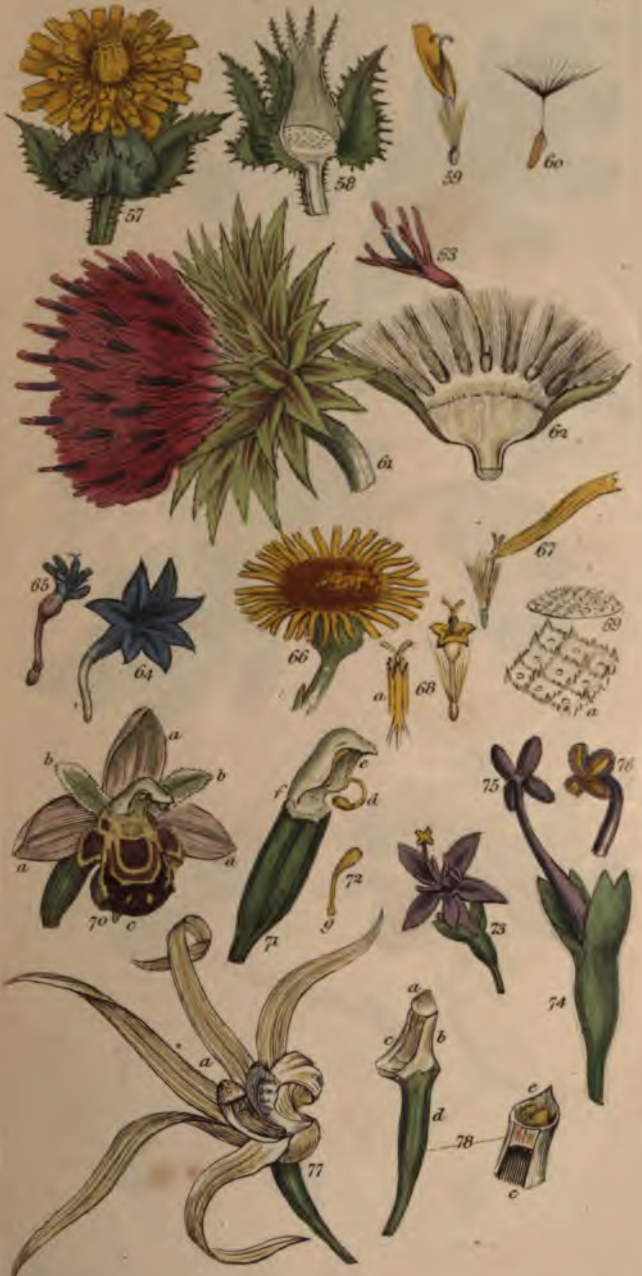
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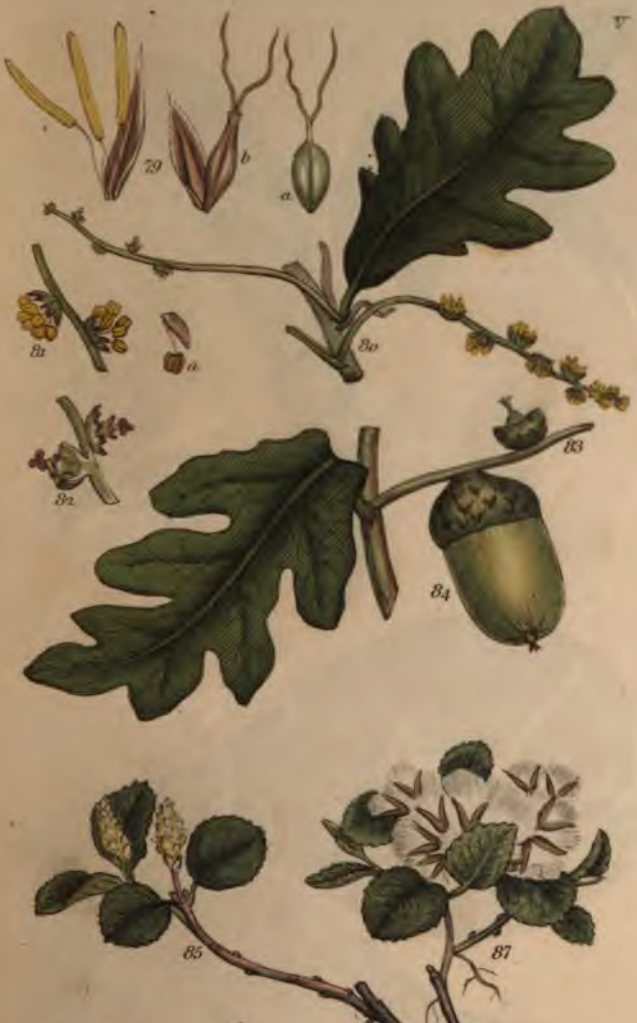
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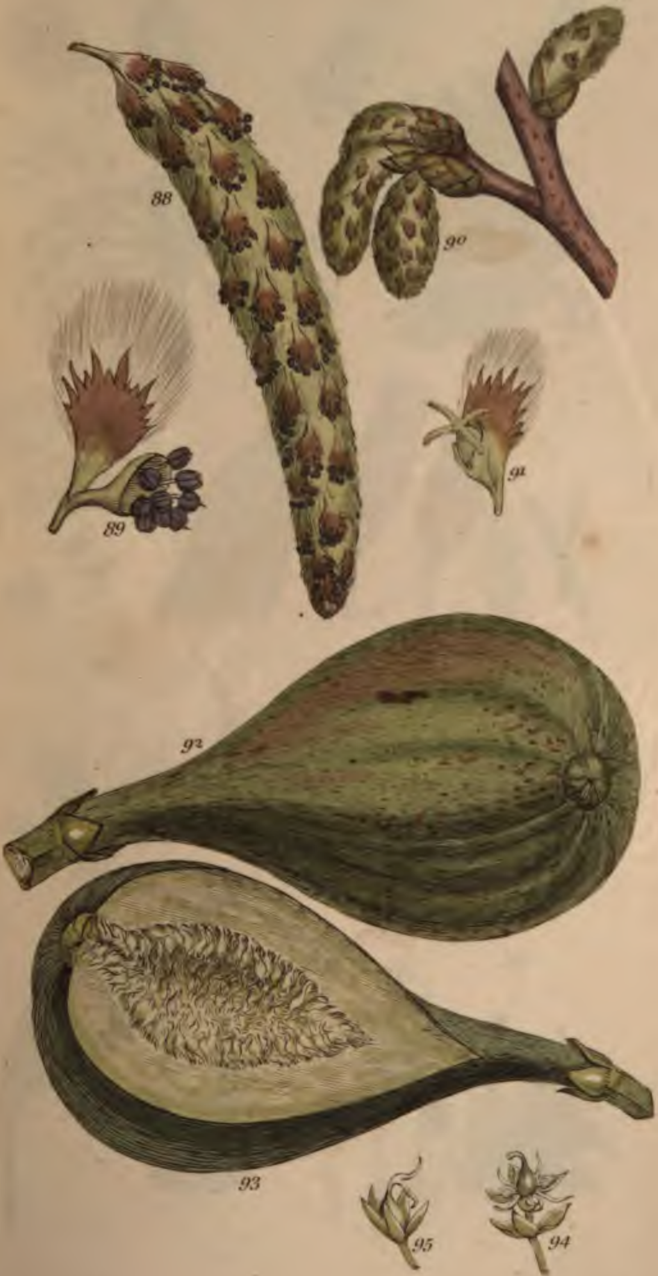

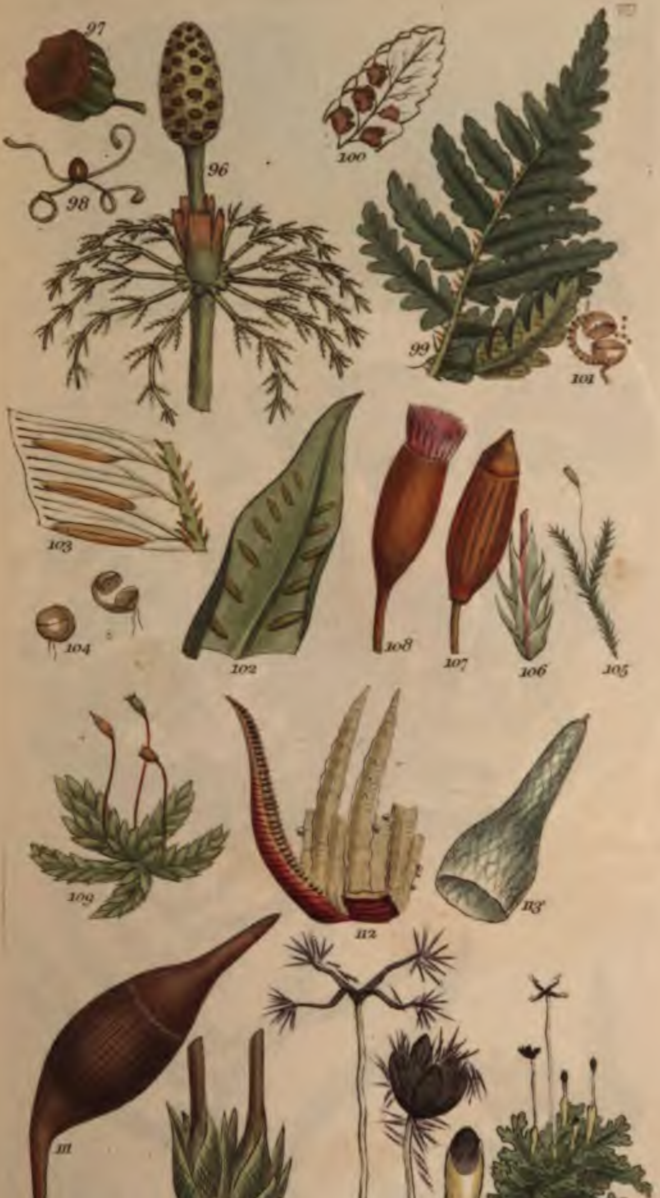
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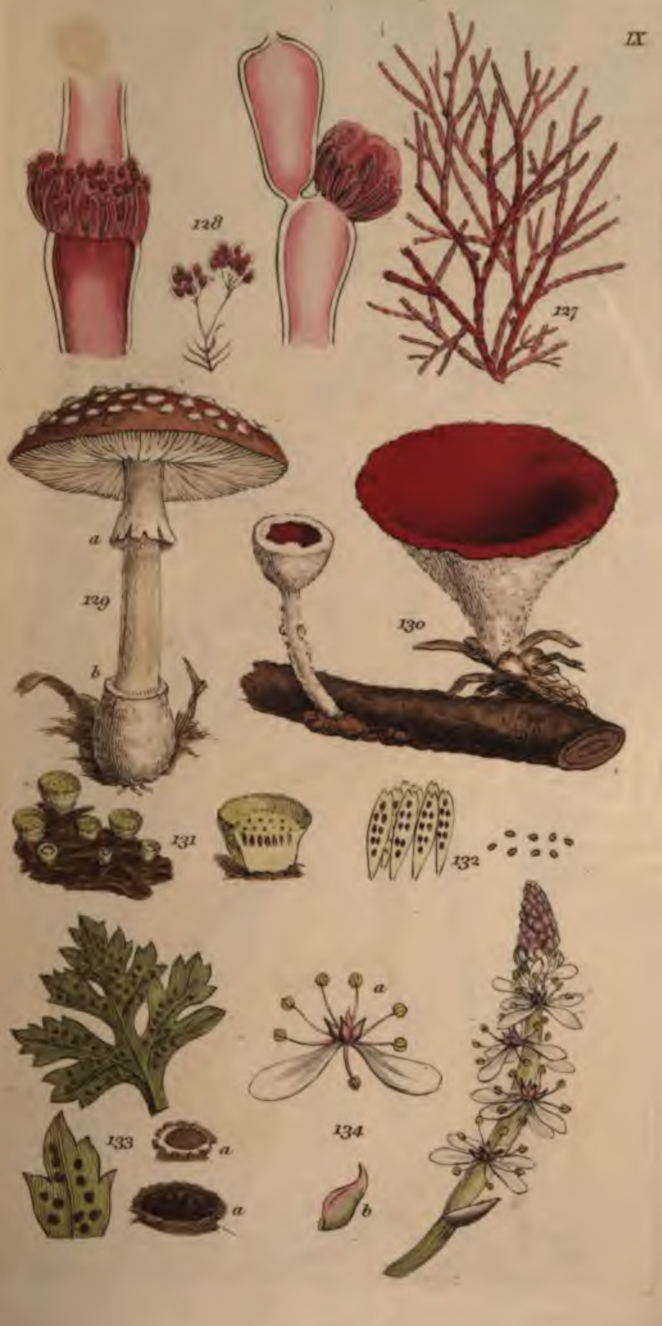
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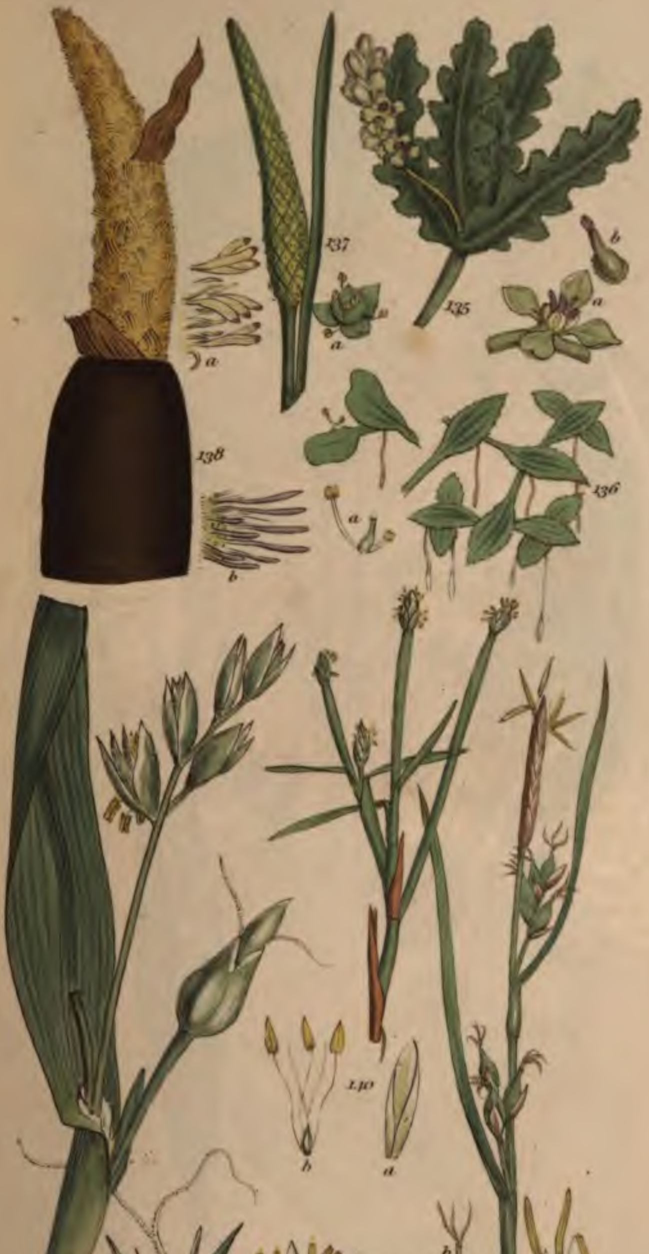
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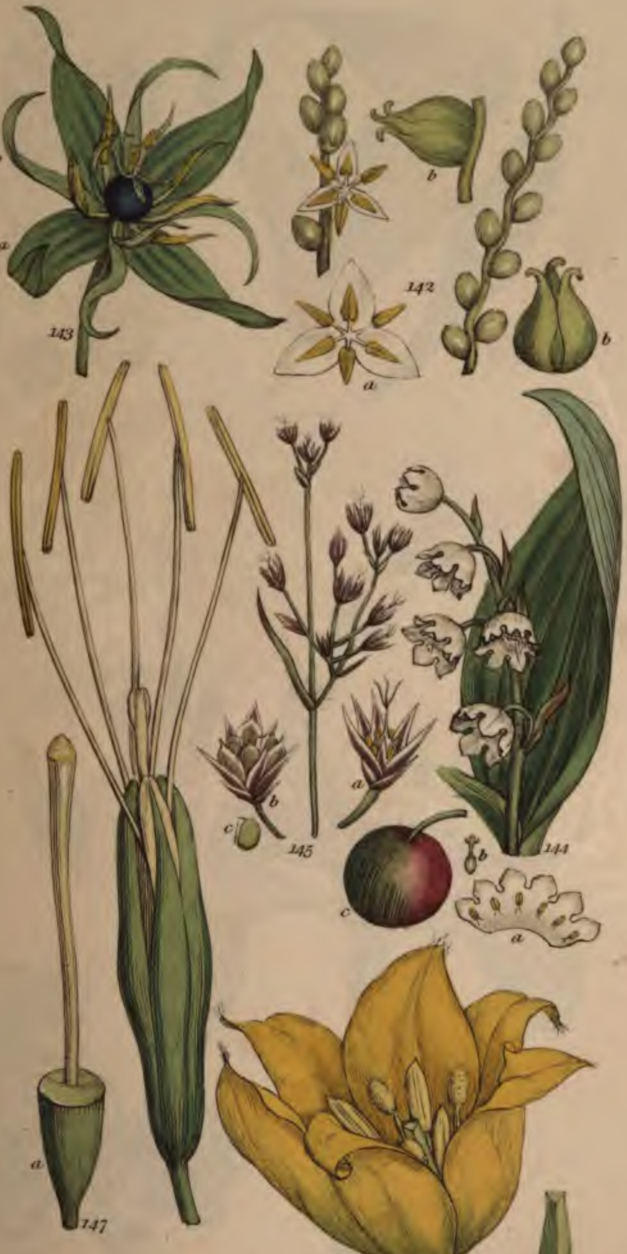
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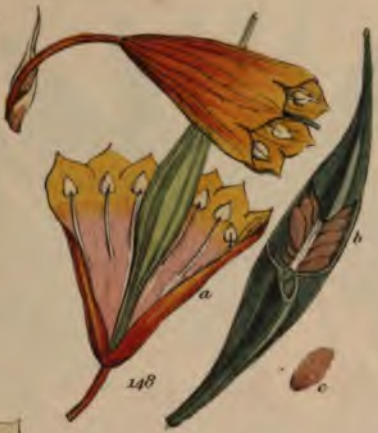

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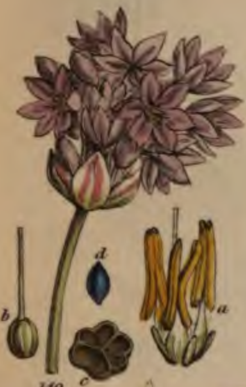

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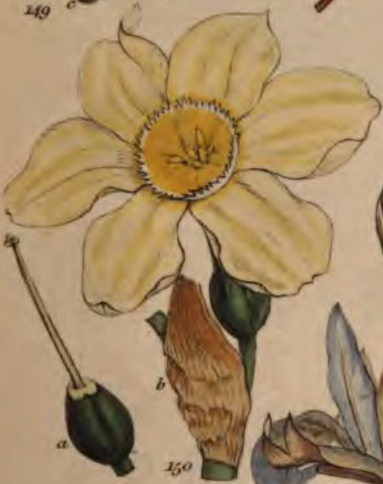

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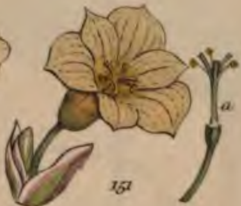

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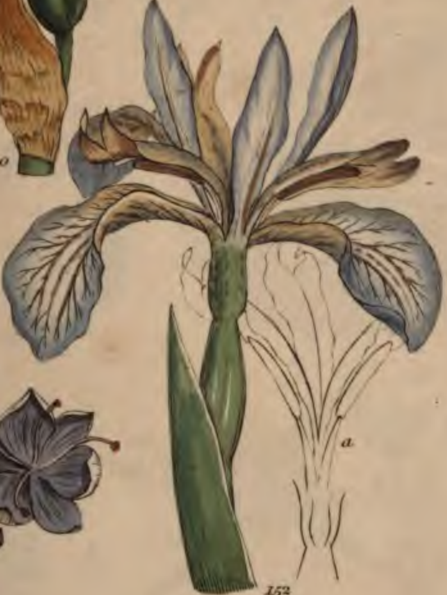

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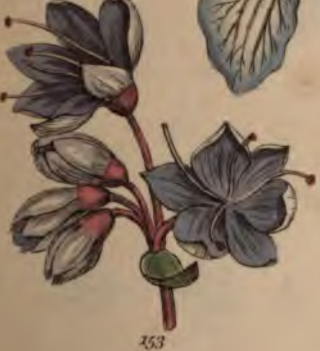

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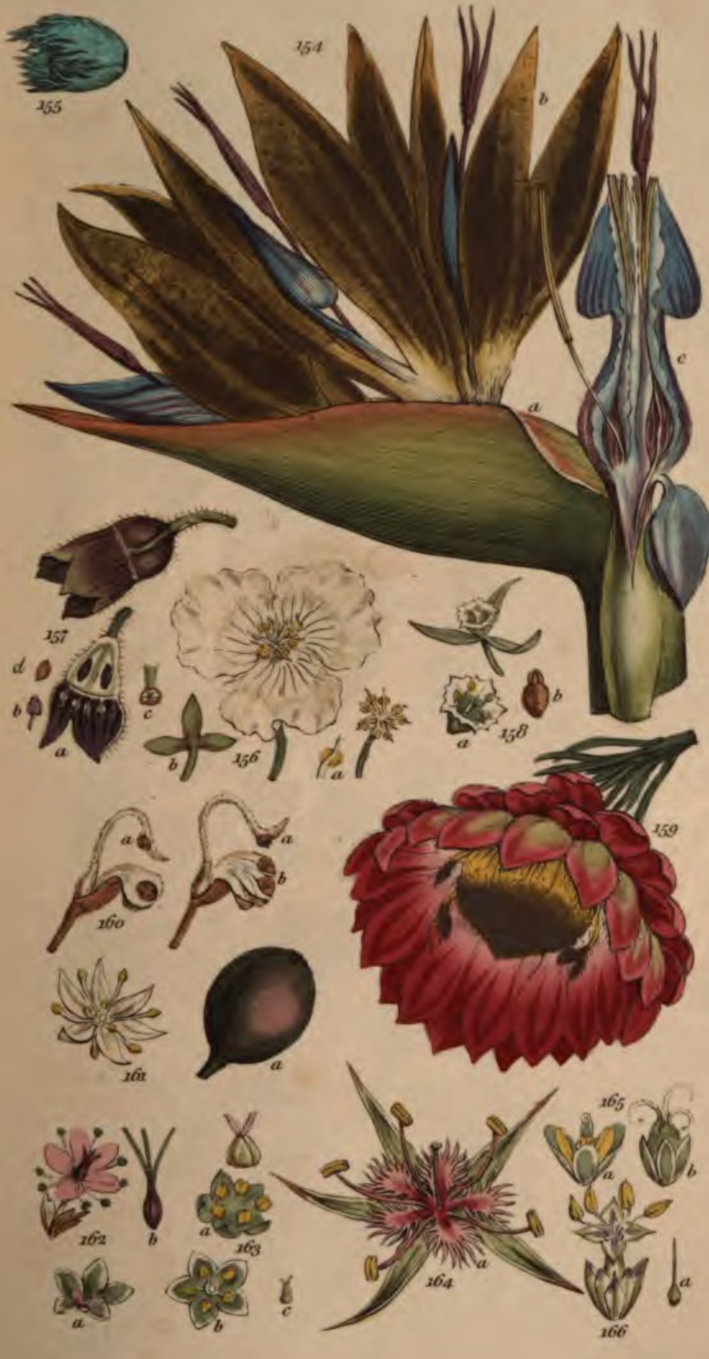
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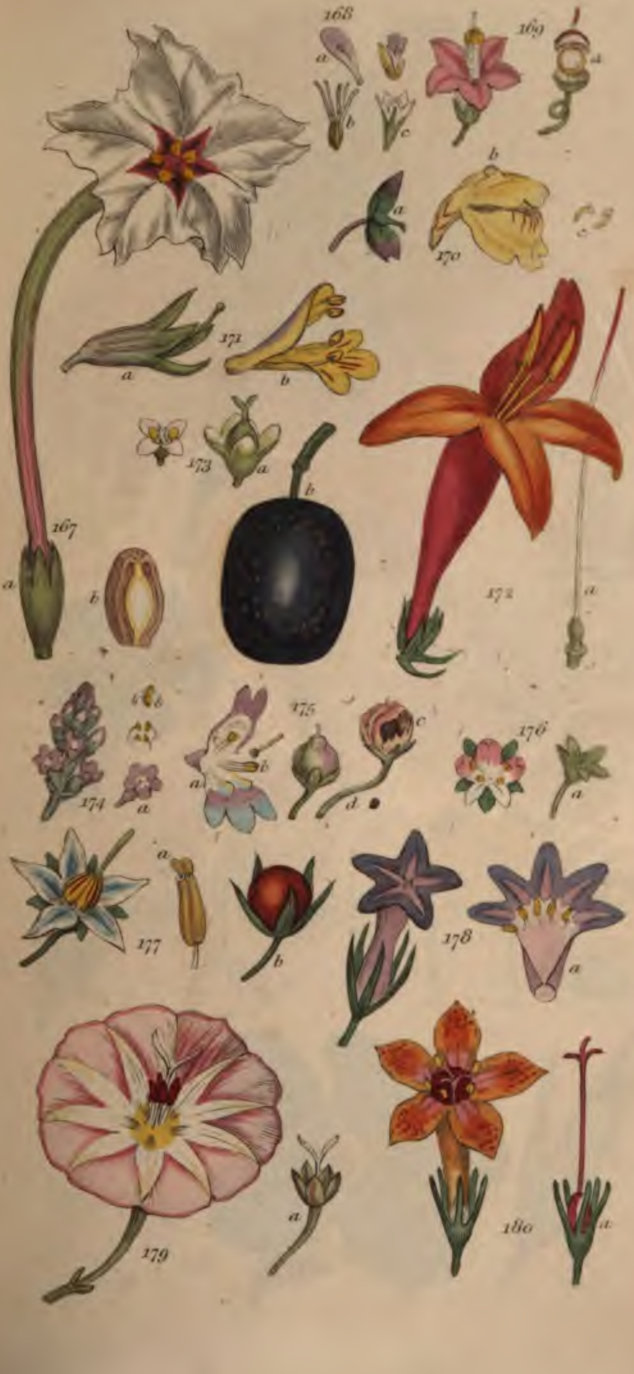
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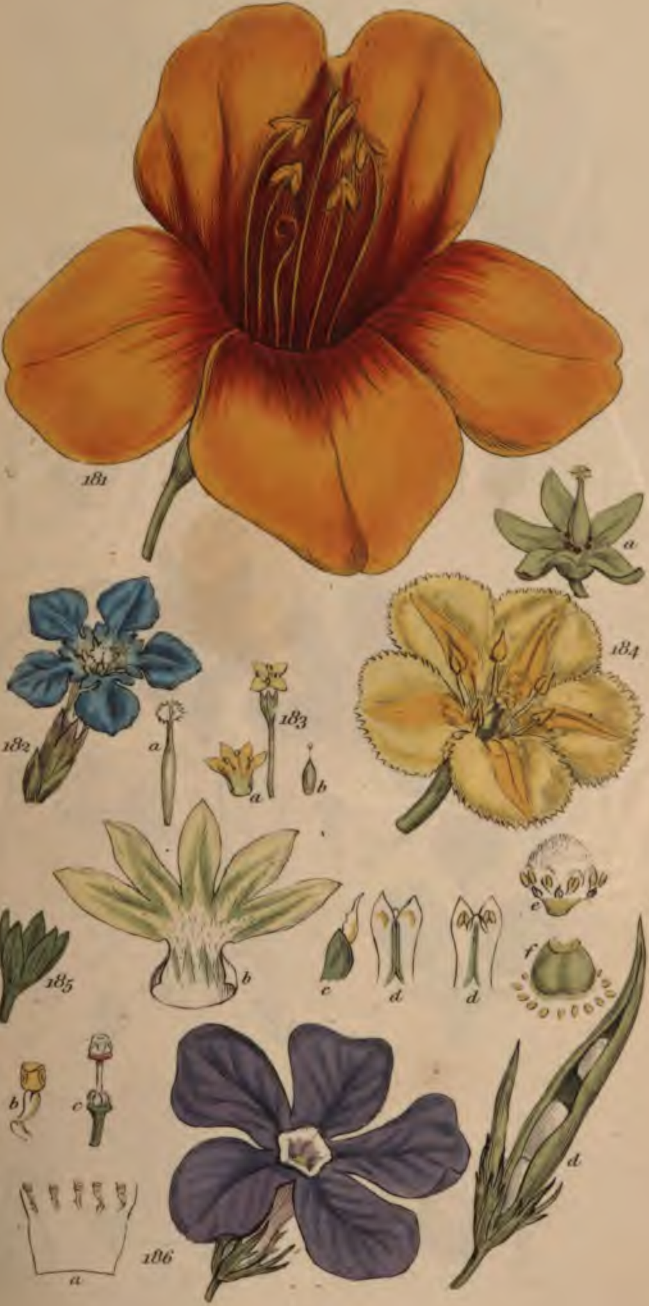

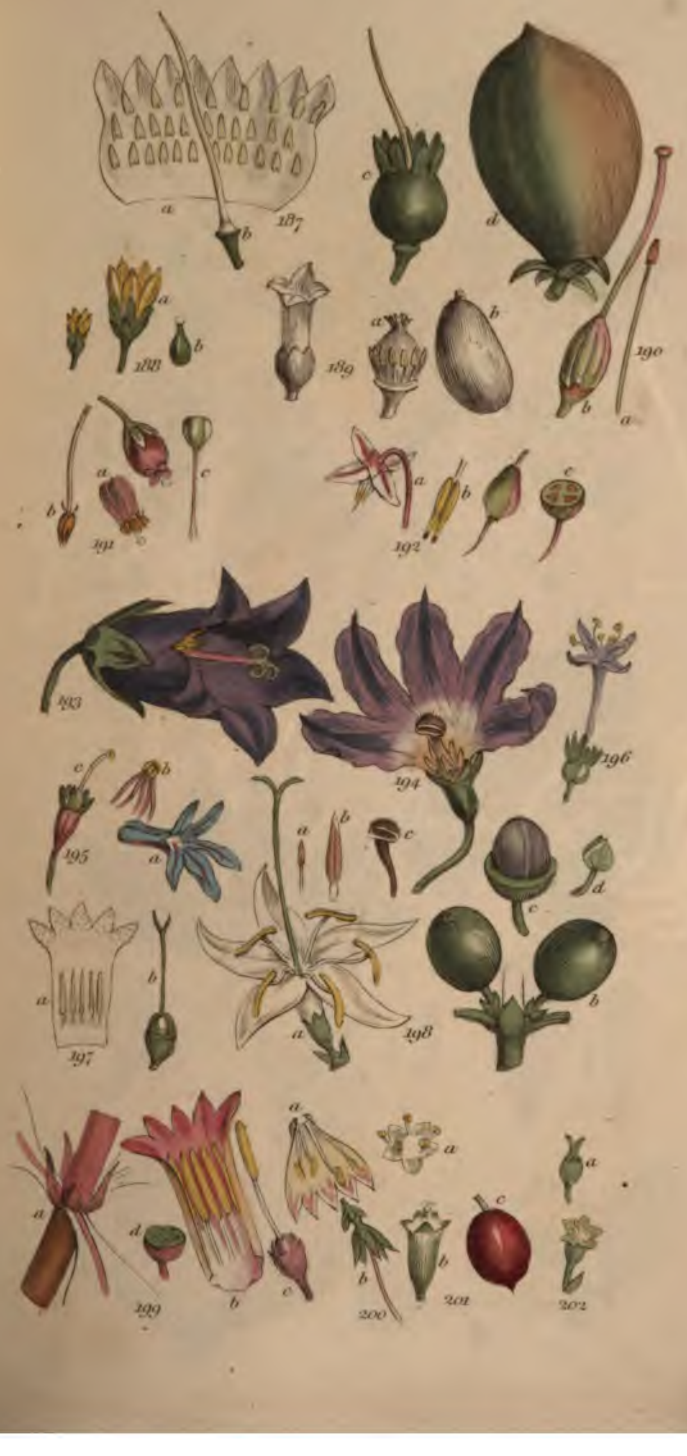
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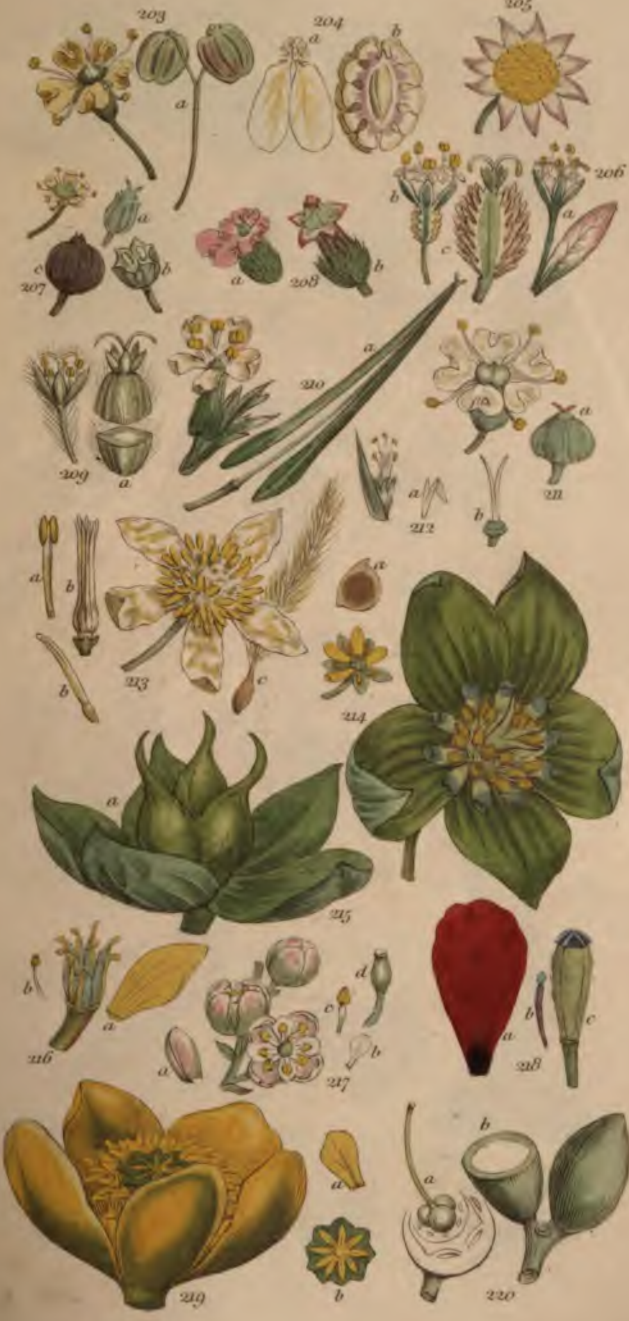
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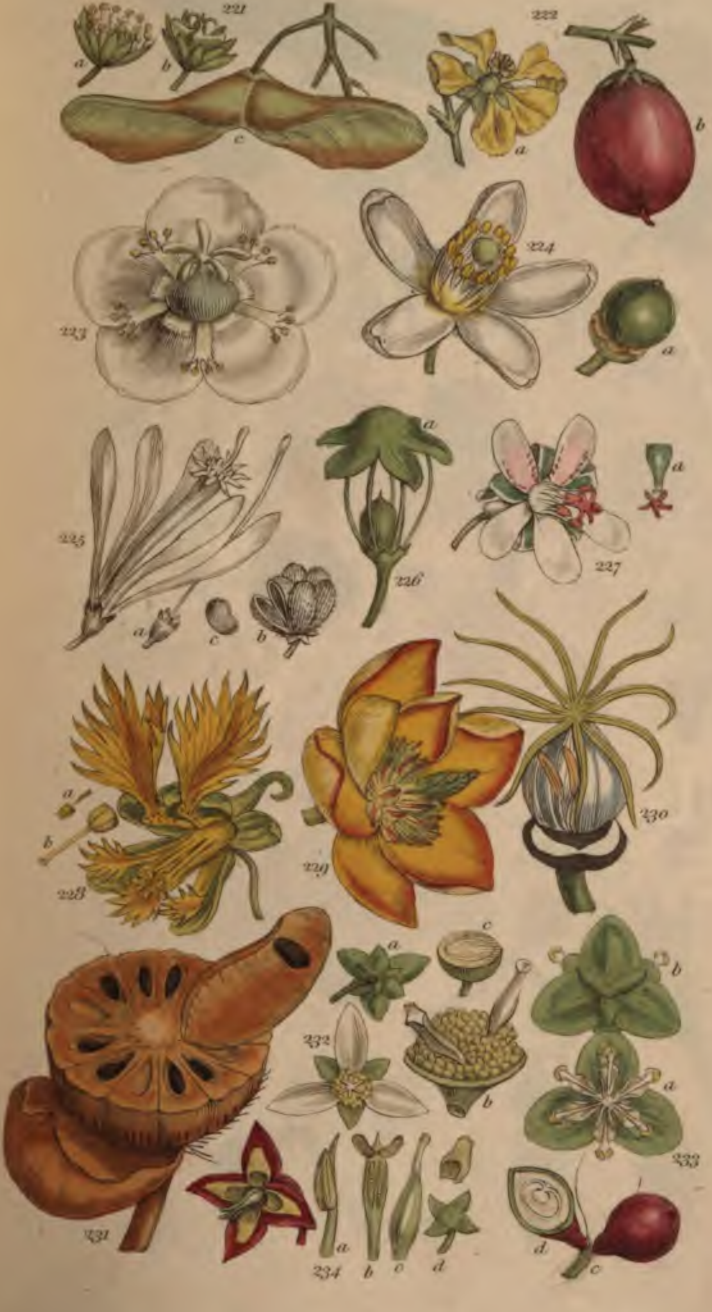
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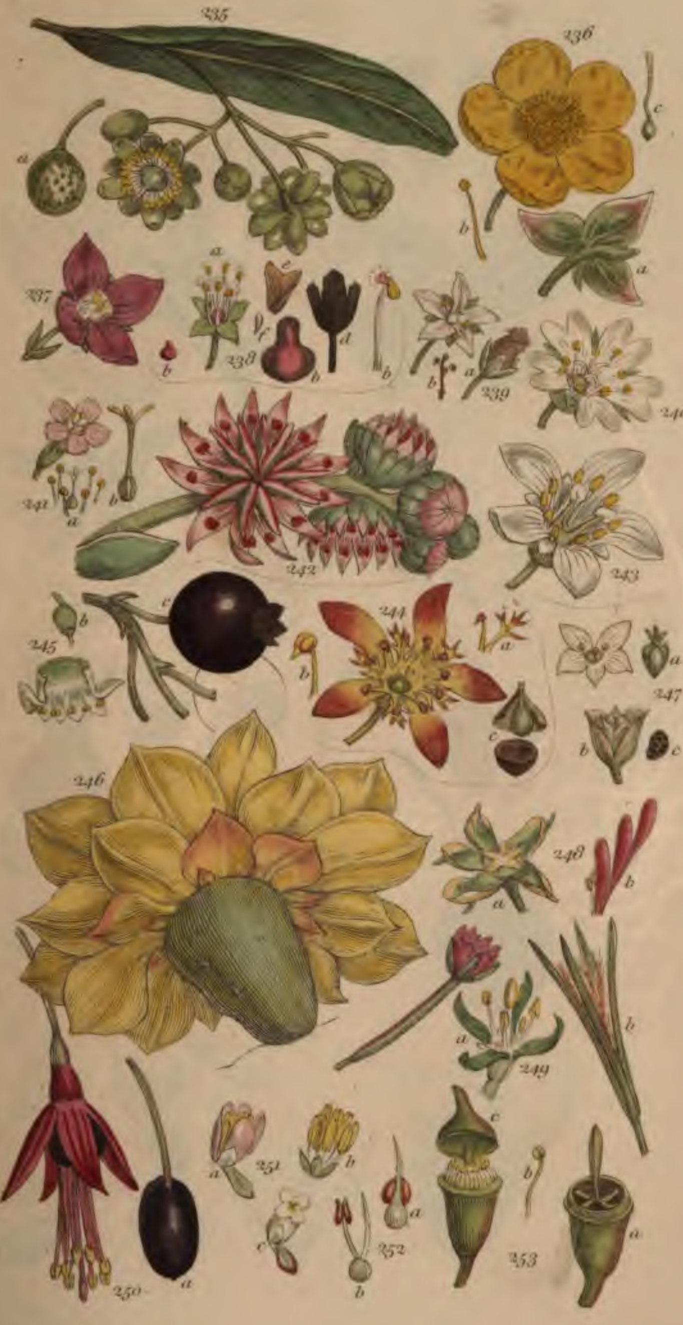
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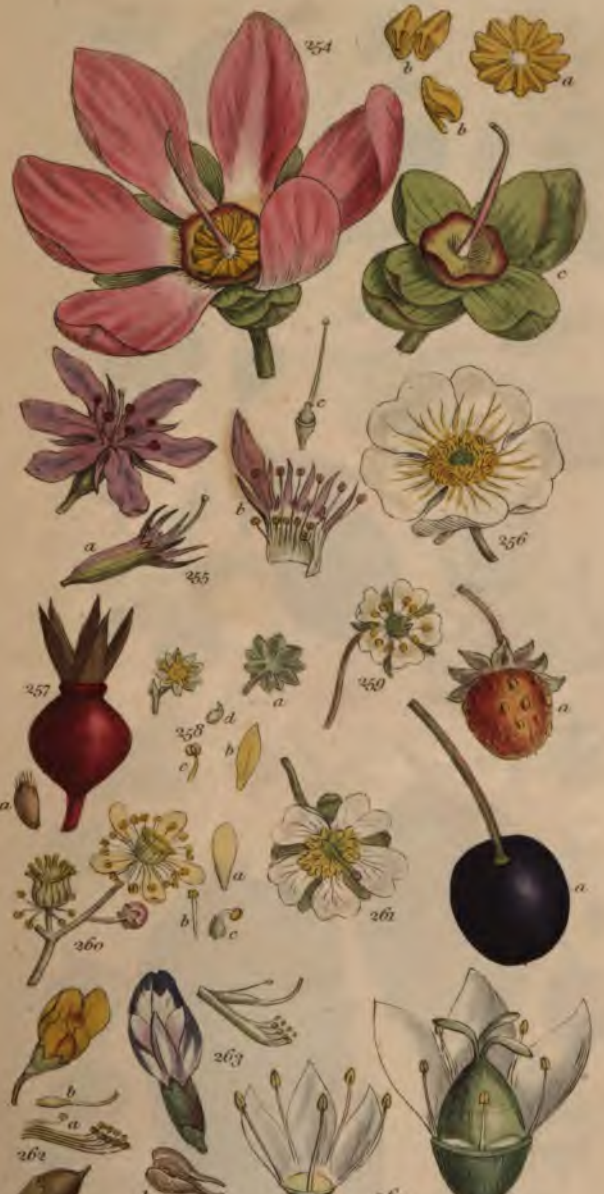
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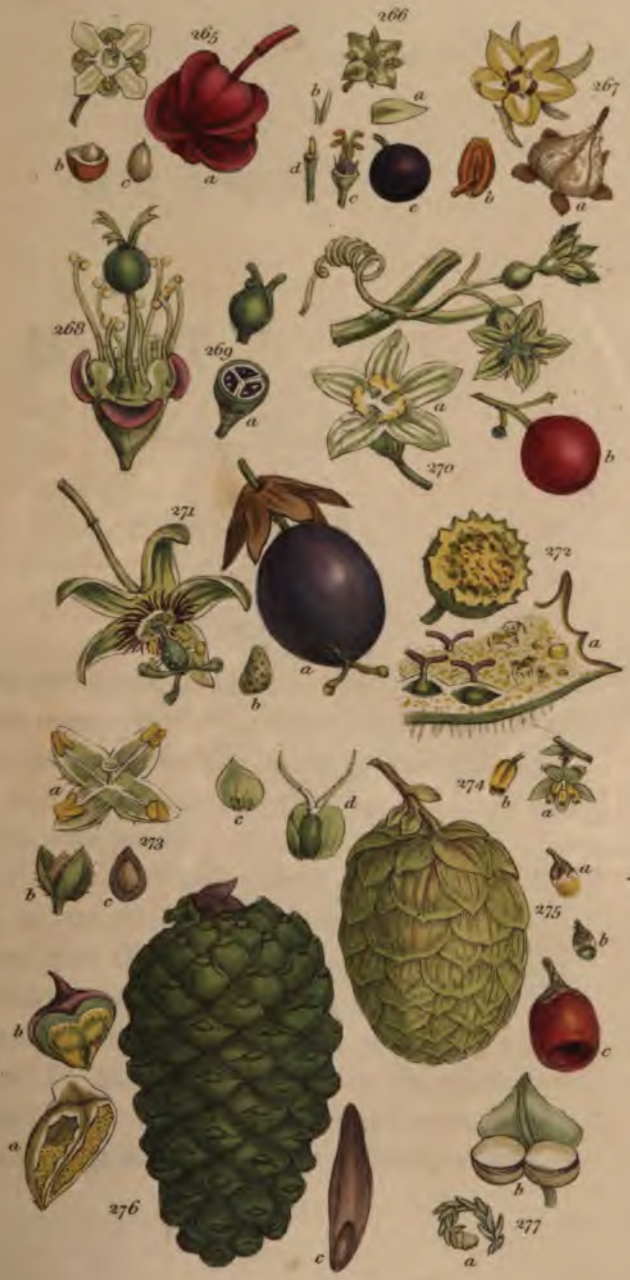
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GRAMMAR

OF

BOTANY.

CHAPTER I.

SUBJECT.

1. BOTANY teaches the knowledge of Plants, either, 1, with respect to their characters and distinctions; 2, their structure and the uses of their several parts; or 3, their various qualities with regard to mankind, and the brute creation.

2. The 1st is called Systematical, the 2d Physiological, and the 3d Economical Botany.

3. Systematical Botany is founded on a knowledge of the external structure of plants, and the different forms under which their various parts and organs appear. By this we are enabled to distinguish one species of plant from another, as well as to assemble or arrange them in families, orders or classes.

4. Physiological Botany, besides a knowledge of the external forms of the vegetable body, requires an acquaintance with its internal structure, and the different substances therein produced and contained, termed Secretions, with the purposes which such secretions answer.

5. Economical Botany is either empirical or philosophical. The former originates in the experience and practical observation of mankind, from one age to another: the latter is deduced from a consideration of certain characters in vegetables; either indicating peculiar properties; or pointing out affinities, more or less remote, by which certain known qualities in some plants, are presumed to exist in others.

6. Before any knowledge of Systematical Botany (3), or the Classification of Plants, can be understood, it is necessary to be acquainted with the various parts of which the Vegetable body consists. These are the Root, Stem, Stalks, Buds, Leaves, Appendages, Flower and Fruit.

CHAPTER II.

DESCENDING PART OF A PLANT. ROOT.

7. *Radix*, the Root, serves to fix the plant, and to imbibe nourishment for its support. It usually consists of a *Caudex*, or Body, the top of which is called the Crown; and *Radiculæ*, Fibres; the latter being always present, and constituting the real, or efficient, root. *Radicula*, the Radicle, or Primary Fibre, is the point of the Embryo (62 : 1) first protruded in incipient germination.

8. Roots are distinguished into 7 kinds.

1. *Radix fibrosa*, a Fibrous Root, composed of fibres only, as in many annual plants, and most grasses.
2. *R. repens*, a Creeping Root, as in Mint and Couch-grass.
3. *R. fusiformis*, a Tap Root, like the Carrot and Radish.
4. *R. præmorsa*, an Abrupt Root, as *Scabiosa succisa.*
5. *R. tuberosa*, a Tuberous or Knobbed Root, as the Potatoe, Pæony, and Orchis.
6. *R. bulbosa*, a Bulbous Root, either solid, like that of the Crocus; lamellated, like Onions; or scaly, like the White Lily.

7. *R. articulata* or *granulata*, a Jointed or Granulated Root, like Wood Sorrel, and White Saxifrage.

9. Roots differ in duration, being either annual, biennial, or perennial. Fibrous and Tap Roots are frequently annual; some Tap Roots are biennial; Creeping, Abrupt, Tuberous, Bulbous, and Jointed Roots are always perennial, as are some Fibrous and a few Tap Roots.

10. Annual Roots produce the herbage, flowers, and seeds within the compass of one season, after which they entirely die; Biennial ones produce herbage only the first summer, flowers and seeds the next, after which they also die; Perennial Roots bear herbage and flowers through several successive years, to an indeterminate extent, and moreover increase, or form offsets, either spontaneously, or with the assistance of art.

11. The Root is the first part produced by the Seed, when beginning to vegetate in the earth. It is naturally directed downwards, extending itself at the extremity, and forming fresh fibres every year, such (7) being an essential part of every kind of root, the vegetation of which, and of the plant it bears, going on only while the fibres continue to grow, and to imbibe nourishment.

CHAPTER III.

ASCENDING PART. HERBAGE.

12. *Caulis*, the Stem, properly so called, serves to elevate the leaves and flowers above the ground, as in trees, shrubs, and many herbaceous plants, but is not essential to all.

13. The Stem is either annual, or perennial; simple, or branched; leafy, scaly, or naked; solid, or hollow; upright, twining, climbing, procumbent, or creeping; straight, spreading, or zigzag; round, angular, winged, or compressed; smooth, downy, hairy, bristly, or prickly; even, striated, furrowed, or warty.

14. A branched Stem (13) is either irregularly subdivided, or

1. *Caulis dichotomus*, a Forked Stem, having a flower at each fork or subdivision.
2. —— *alternè ramosus*, alternately branched, the branches being solitary, and variously directed.
3. —— *oppositè ramosus*, oppositely branched, when two branches stand together, spreading in opposite directions.
4. ——*verticillatus*, whorled, many branches spreading in every direction from one point.
5. —— *determinatè ramosus*, abruptly branched,

when each branch, after terminating in flowers, sends out numerous shoots from near its extremity.

6. *Caulis articulatus*, jointed, as in Samphire, and *Cactus*.
7. —— *distichus*, two-ranked, the branches spreading in two opposite directions.
8. —— *brachiatus*, four-ranked, when they spread in four directions.
9. —— *volubilis*, twining, turns spirally; to the right in some plants, to the left in others, invariably.

15. Plants without a stem are termed *acaules*, stemless, and the leaves are then necessarily radical, springing directly from the root.

16. *Culmus*, a Culm or Straw, the peculiar stem of Grasses, is leafy, cylindrical, well known, though not easily defined, nor is this term very necessary. See fig. 139, 141.

1. *Culmus enodis*, simple, or without joints, as in *Juncus effusus*, &c.
2. ——— *articulatus*, jointed, as in Oats, and most Grasses.
3. ——— *geniculatus*, bent, at one or more joints, like the knee or elbow.

The surface is either smooth, rough, downy or hairy, never prickly; often striated or furrowed.

17. *Scapus*, a Stalk, springs from the root, and bears the flowers and fruit, but no leaves.

18. The *Scapus* is either simple or branched; single-

or many-flowered; erect or procumbent; straight, wavy, or spiral, as in *Cyclamen* and *Valisneria* after flowering.

19. *Pedunculus*, a Flower-stalk, springs from some part of the stem, and bears the flowers and fruit; if radical, it is a *Scapus*.

20. A Flower-stalk is either terminal or lateral: if lateral, it is either axillary, or *oppositifolius* (opposite to each solitary leaf), or *interpetiolaris* (between the bases of 2 foot-stalks, laterally), or *internodis* (from the part of a branch between 2 joints, or leaves). It is termed *gemmaceus*, when proceeding from the same bud with the leaves. It is simple or compound; solitary or aggregate; erect, spreading, drooping or pendulous.

21. Flowers destitute of a stalk are termed *sessiles*, sessile.

22. *Pedicellus*, a partial Flower-stalk, is the ultimate division of a *Pedunculus* (19). It is also used for the Fruit-stalk, elevating the *Germen* and *Fruit* in Mosses, and some other plants.

23. *Petiolus*, a Foot-stalk, is the stalk of a Leaf, very rarely connected with, or bearing, the flower-stalks. This part, usually channelled along the upper side, is either simple, as in all simple, and some compound leaves; or compound, either once, twice, or more; and sometimes, as in the Pea and Vetch tribe, ends in tendrils (47 : 5).

24. *Frons*, a Frond, is a stem and leaf in one, bearing the fructification, as in Ferns, where the flowers and seeds grow mostly on the back; or the *Lichen* and Sea-weed tribes, where they are more or less imbedded in the leafy or crusty substance of the plant. This term is only used in the class *Cryptogamia*, whose flowers are anomalous, or ill understood. In spiked Ferns the frond is partially transformed into fructification.

25. *Stipes*, a Stipe, is the Stem of a Frond (24), as in Ferns, where it is commonly scaly; or the stalk of a *Fungus*, (Mushroom) fig. 129.

26. *Gemma*, a Bud, contains the rudiments of a plant, or part of a plant, latent, and wrapt up in scales, till the season is fit for their expansion. *Vernatio* is used by Linnæus to express the disposition or folding of the scales.

27. Buds chiefly belong to trees of cold or temperate climates, and powerfully resist cold till they begin to open.

28. The Buds of herbaceous plants (10) are radical. Bulbs are the buds of a certain tribe of herbs (8), their scales being no other than subterraneous leaves, as is evident in *Lilium*.

29. Some buds contain only leaves, others only flowers (20), others both.

30. *Folium*, a Leaf, a very general, but not universal organ, is of an expanded form, usually green, pre-

senting its upper surface to the light, the under commonly differing in hue, and in kind or degree of roughness. The inside is pulpy and vascular.

31. Leaves receive the sap from the wood by one set of vessels, and expose it to the action of air, light and heat by their upper surface, while what is superfluous passes off by the under. The Sap thus changed assumes peculiar flavours, odours, and other qualities, and is sent by another set of vessels into the bark, to which it adds a new layer every year internally, and another layer to the external part of the wood. Hence the concentric circles in trees, the number of which shows their age, and the breadth of each circle, the abundance and vigour of the foliage which formed it.

32. Leaves are wanting in some tribes of plants, whose stems are usually very succulent; such as *Salicornia*, *Cuscuta*, *Stapelia*.

33. The *situation* of Leaves (30) is either at the root, or on the stem or branches; alternate, scattered, opposite, crowded, whorled (3, 4, or more in a whorl), or tufted.

34. Their *position* is either close-pressed to the stem, imbricated, erect, spreading, horizontal, reclinate, recurved, or inflexed; oblique (or twisted) or reversed (the upper surface turned downward); depressed, floating, or immersed; two-ranked (spreading two ways 14:7); decussated (crossing each other in pairs); or unilateral (leaning all to one side).

35. Their *insertion* is either sessile or stalked; peltate, clasping, connate, perfoliate, sheathing, equitant, or decurrent.

36. Their *form* is simple, or compound in various degrees; undivided, or lobed; their outline very various in different plants; sometimes different on the same individual. The lower leaves of water plants, the upper of mountain ones, have commonly the greatest tendency to be much divided. For their particular forms see *Introduction to Botany.*

37. *Foliola*, Leaflets, are the partial leaves, which, connected by one common, simple or branched, footstalk (23), make a compound leaf.

38. The *margin* of Leaves or Leaflets is either entire, wavy, serrated, jagged, toothed or notched, in a simple or compound manner; naked, fringed, spinous, cartilaginous, glandular; flat, revolute (rolled backward), or involute (the reverse).

39. Their *surface* is smooth, naked, glaucous, downy, hairy, woolly, warty, glandular, or prickly; even, rugged, or blistery; veiny, ribbed, or veinless; coloured, variegated, opaque, or polished. Their ribs and veins contain the principal sap-vessels.

40. Some Leaves are fleshy, cylindrical, semicylindrical, awlshaped, tumid, channelled, keeled, two-edged, hatchet-shaped, solid, or hollow.

41. Others are membranous, leathery, rigid, or almost woody.

42. The *termination* of Leaves is either obtuse, acute,

pointed, obtuse with a point, spinous-pointed, or cirrhose as in *Gloriosa;* abrupt, jagged-pointed, retuse, or emarginate.

43. With respect to division (36), Simple Leaves are either cloven, lobed, sinuated, deeply divided, laciniated, or cut; palmate, pinnatifid, pectinate, unequal (as in *Begonia*), lyrate, runcinate, fiddle-shaped, hastate, arrow-shaped.

44. Compound Leaves are either jointed, fingered, binate, (or conjugate,) ternate, quinate, pinnate with or without an odd leaflet, whorled, or auricled; they are simply, doubly, thrice, or more, compound; pedate, twice paired, twice ternate, or doubly pinnate, &c.

45. In duration, Leaves are either deciduous or evergreen; the former lasting but one summer; the latter two or more, though a fresh crop is produced every year, so that the tree or shrub is never stripped.

46. Some Leaves or Leaflets are *continuous,* never separable from the stem or footstalk, as in *Ruscus,* the natural order of *Musci* (Mosses), and the genus *Jungermannia.*

47. *Fulcra,* Appendages, belong to the herbage of a plant, and are of 7 kinds.

1. *Stipula,* the Stipula, a leafy appendage to the proper Leaves (30), or their Footstalks (23); usually in pairs, at the base of the latter, either united thereto, or distinct; sometimes simple and

intrafoliaceous (withinside of the leaf), as in Grasses, fig. 141, and *Polygonum*, as well as the tribe called *Rubiaceæ*, fig. 198, 199. In some of the latter they are divided, or compound. Some Stipulas are soon deciduous, others permanent as long as the Leaves. This organ is by no means universal, even in the same genus, as *Cistus;* nor constant in the same species, as *Salix*.

2. *Bractea*, the Floral Leaf, a leafy appendage to the Flower, or its Stalk (17, 19), is often coloured; either deciduous, or as permanent as the Flower-stalk, to which it is sometimes firmly attached.
3. *Spina*, a Thorn, originates in the wood itself, and by culture in rich soil, disappears, becoming a branch. Footstalks (23) sometimes harden into spines; as do Stipulas (47 : 1) in *Xanthium*; and Flower-stalks (19) in *Pisonia*.
4. *Aculeus*, a Prickle, arises from the bark only, as in Roses, and does not disappear by culture.
5. *Cirrus*, a Tendril, a true *fulcrum* or support, is either axillary, or terminates a Leaf (42) or a Footstalk (23) or even a Flower-stalk (19), serving to sustain weak stems upon others. Tendrils, at first straight, soon turn spirally, and in some instances turn again, in the contrary direction. They are simple or branched; their extremities often dilated and adhesive. The fibrous supports of Ivy are peculiar Tendrils, not Roots. Foot-

stalks (23) sometimes perform the office of Tendrils, as in *Clematis cirrosa.*

6. *Glandula,* a Gland, a small tumour, discharging a fluid, either resinous, oily, or saccharine.
7. *Pilus,* a Hair, including all the various hairy, woolly, bristly, or even tubercular, clothing (or pubescence) of plants. Such hairs are either simple, hooked, forked, starry, or branched, generally jointed and tubular; either harmless, pungent, or stinging; erect, close-pressed, or deflexed; flexible, rigid, or brittle and deciduous. They protect plants against heat and cold, or the attacks of animals. They are very often excretory ducts, discharging more or less of an oily, glutinous, odoriferous, or colouring fluid.

CHAPTER IV.

INFLORESCENCE.

48. *Inflorescentia,* the Inflorescence or Mode of Flowering, expresses the manner in which Flowers are situated upon a plant. It is essential, though of temporary duration, and comes under the following denominations.

1. *Verticillus,* a Whorl, when the Flowers form a ring round the stem, though perhaps inserted on two of its opposite sides, or even on one only.
2. *Racemus,* a Cluster, consists of scattered Flowers, each on its own proper stalk (22), connected by one common stalk (20), all nearly in perfection together. A Cluster is sometimes compound; or aggregate like *Actæa racemosa.*
3. *Spica,* a Spike, is composed of many Flowers, sessile, or nearly so (21), on one common stalk, sometimes branched, generally very erect; the flowers opening in succession; sometimes unilateral (34). *Spicula,* a Spikelet, is the inflorescence of such Grasses, as have many florets in one calyx.
4. *Corymbus,* a Corymb, a kind of Cluster (48:2), whose partial stalks are gradually longer downwards, so that the flowers they bear are nearly

on a level. After flowering this usually becomes a perfect *Racemus*.

5. *Fasciculus*, a Tuft, is composed of numerous level Flowers, on little stalks, variously connected and subdivided.

6. *Capitulum*, a Head, consists of sessile Flowers, crowded together into a globular figure, the central, or terminal ones generally opening first.

7. *Umbella*, an Umbel, is formed of several Stalks, radiating from a centre, and nearly equal in length, so as to compose a level, or convex, rarely concave, surface of flowers. It is, in true Umbelliferous plants, rarely simple, generally compound, each Stalk, or Ray, bearing a Partial Umbel, *Umbellula*. The Umbel in such plants is termed *flosculous*, when the flowers are all nearly equal and uniform; *radiant*, when the marginal ones are more or less irregular and unequal. In other orders of plants the Umbel, if present, is generally simple, but less perfect as to the insertion of its stalks; witness the orders of *Apocineæ* and *Asclepiadeæ*. In *Euphorbia*, the General Umbel consists of stalks repeatedly forked, not umbellate.

8. *Cyma*, a Cyme, consists of several Stalks, springing from one common centre, like an Umbel, but subdivided in an irregular, somewhat alternate, mode, and forming a nearly level, or mostly convex, surface of flowers.

9. *Panicula*, a Panicle, is a loose, irregularly subdivided, Cluster (48:2); either *diffusa*, lax; or *coarctata*, dense; the Flowers are generally drooping; sometimes unilateral.

10. *Thyrsus*, a Bunch, is only a very dense or close Panicle, assuming an ovate form. Such is a Bunch of Grapes.

CHAPTER V.

FRUCTIFICATION, OR FLOWER AND FRUIT.

49. *Flos*, the Flower, is a temporary part of a plant, destined to form, and to perfect, the Fruit and Seed, which it always precedes, and is therefore essential.

50. *Fructus*, the Fruit, and especially *Semen*, the Seed, is the ultimate object of all the other parts of fructification, destined to reproduce and continue the species, terminating the old individual, and beginning the new.

51. Annual or Biennial Plants (10) literally finish their existence in producing one crop of Seeds. Perennial ones renew their life, as it were, every season, either in the Root, or Root and Stem, acquiring a new layer of Wood and of Bark (31), as well as a new set of Leaves (45), and of Flowers (49), affording an annual supply of Fruit and Seed.

52. The parts of Fructification are seven; four of them, *Calyx*, *Corolla*, *Stamina*, and *Pistilla*, belonging to the Flower; two, *Pericarpium* and *Semen*, to the Fruit; and one, *Receptaculum*, is common to both.

53. *Calyx*, the Calyx, or outer integument of a Flower, not universal in all Flowers, resembles the Leaves in texture and colour (30), and perhaps performs their functions (31) as far as the Flower- or Fruit-

stalk is concerned. It also frequently shelters and protects the more delicate internal parts; is either general or partial; permanent or deciduous; simple or double; of one leaf or of several; undivided, cloven, or manycleft. There are 7 kinds of Calyx.

1. *Perianthium*, Perianth, or Calyx commonly so called, the most general, is that which is contiguous to, or actually makes a part of, the Flower, but is not always present. This is sometimes double. It differs in situation with regard to the Germen (59), being either superior or inferior to that organ; sometimes intermediate, or surrounding it about the middle. Its forms are extremely various, of one leaf or of several; regular or irregular; simple, or with an external, generally smaller, calyx, *Calyculus;* or other appendages, as in *Pultenæa.* It is either round, or angular; compressed, tumid, or inflated; leafy, coriaceous, or membranous; sometimes finally pulpy; smooth, hairy, or prickly. In Compound Flowers generally composed of imbricated scales, which close over the Seeds.

2. *Involucrum*, an Involucrum, is remote from the rest of the Flower, partaking of the nature of a *Bractea* (47:2), and chiefly noticed in the characters of proper Umbelliferous Plants (48:7). This part is either general, or partial; the latter being denominated *Involucellum.* The *Involucrum* of Ferns is membranous, covering the

masses of fructification, termed *Sori*, fig. 100, 103, but not invariably present.

3. *Amentum*, a Catkin, consists of a cylindrical common Receptacle (63), beset with numerous firmly inserted Scales, each scale accompanied by one or more Stamens (58) or Pistils (59); rarely both. The pistil-bearing Catkin only is permanent after flowering, as it becomes the Fruit. See fig. 85-91.

4. *Spatha*, a Sheath, more or less remote from the Flower, bursts longitudinally, and finally becomes, for the most part, membranous. The elongated common Receptacle, in some instances contained within the *Spatha*, is termed *Spadix*, as in *Arum* and *Calla*.

5. *Gluma*, a Husk, or Glume, the chaffy Calyx peculiar to Grasses. The *Arista*, or Awn, a spiral hygrometrical bristle, is its occasional appendage, though more generally belonging to the chaffy *Corolla* (56) of the same plants.

6. *Perichætium*, a Scaly Sheath, investing the fruit-bearing Flowers of some Mosses, fig. 106, 110; and remaining at the base of their Fruit-stalk (22).

7. *Volva*, a Wrapper, the membranous covering of the tender fructification in some of the *Fungus* tribe, as the Gills of Mushrooms, which are finally exposed, by the *Volva* forming a ring round the Stalk (25). The same term is used,

in the same tribe, for the fleshy external coat, or case, of several kinds of Puff-ball, and those Agarics, which constitute Persoon's genus of *Amanita*. See fig. 129, *a.* and *b.*

54. *Corolla*, the Corolla, or inner integument of a Flower, generally more dilated, delicate, and coloured, than the Calyx, is not always present. This organ is supposed to perform some function with respect to air and light, analogous to that of the Leaves; but limited to the use of the more essential internal organs. It consists frequently of two distinct parts, the Petal and the Nectary.

55. *Petalum*, the Petal, is either one or more, regular or irregular; equal or unequal; transient and deciduous, or withering and permanent; variously coloured; often fragrant; frequently bearing honey, without any particular apparatus, or Nectary (57).

56. A Corolla of one Petal, or piece, is called monopetalous; one of several, polypetalous. The base of the former is named *Tubus*, the Tube; the spreading part, variously divided, the *Limbus*, or Limb. The base of each Petal, in a polypetalous Corolla, is the *Unguis*, Claw; the expanded part the *Lamina*, Border. The more or less hollow, or dilated, part, within the mouth, (or eye as it is sometimes called,) in both, is denominated *Faux*, the Throat, and is either open and pervious, or closed with hairs, scales, or valves.

5". *Nectarium*, the Nectary, secretes or contains honey, a nearly universal fluid in Flowers, but not always lodged in any organ, distinct or separate from the Petals (55). When it is so, the Nectary is either an assemblage of Glands (47 : 6), or a tubular elongation of the Petal, or of the Calyx, or a sort of Crown, or variously-formed appendage, to the former. Honey brings insects about flowers, to assist in the dispersion of the Pollen (58).

58. *Stamina*, the Stamens, internal with respect to the Corolla (54), are essential to every species of plant, in some form or other. Each Stamen consists of an *Anthera*, Anther, usually membranous, of two cells, bursting lengthwise, or sometimes opening by terminal pores, rarely by a lid or valve: and of a *Filamentum*, Filament, various in length and proportion, supporting the Anther, but not invariably present. The *Pollen*, or Dust, contained in the Anther, consists mostly of fine grains, bursting with moisture, and discharging an elastic vapour. In some of the *Orchis* tribe, the *Asclepiadeæ* (48 :7), fig. 185, *Mirabilis*, 167, and a few others, the Pollen is glutinous, waxy, or elastic and very tenacious.

59. *Pistilla*, the Pistils, central, essential, not always in the same Flower with the Stamens, but in another of the same species. Each consists of a *Germen* *

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* Gærtner, who is followed by the French and some others, prefers the term *Ovarium* to *Germen*. But *Ovarium* is used by anatomists for a peculiar animal organ, unknown in vegetables, and can only lead to error if applied to them. This has been shown long ago.

or Seed-bud, which is essential; *Stylus*, the Style, one or more, not always present; and *Stigma*, the Stigma, which is essential. The Stigma is moist or glutinous, to retain the Pollen, which bursts there, and serves to perfect the Seed in the Germen.

60. *Aestivatio*, which may be englished by Aestivation, or by Flower-budding, expresses the mode in which the divisions of any Corolla (54-56) are disposed in the bud. It is either *imbricata*, folded, from left to right, as in *Cistus*, or from right to left, as in *Hypericum*: or *valvata*, valvular, the divisions meeting side by side, as in *Protea*.

61. *Pericarpium*, the Seed-vessel, formed of the enlarged germen, is extremely various, but not invariably present. It serves to protect the Seeds till ripe, and then, by one means or other, to promote their dispersion. When dry, it often bursts elastically; when pulpy, it is usually the food of animals, who thus convey its contents to a distance. The principal forms of the Seed-vessel are the following.

1. *Capsula*, a Capsule, finally dry, membranous or woody, rarely externally pulpy, opening by valves, or by pores, or by the swelling of the seed; internally of one cell or several, separated by *dissepimenta*, partitions, and bearing the Seeds either on the margins of its valves, or partitions, or on the Central Column, *Columella*. The partitions

originate either from the margins or centre of each valve, or from the central column, except when single or solitary. *Utriculus* is a thin bladdery, dry, single-seeded Capsule without valves. *Achenium* of Richard is the same thing, whether membranous, or coriaceous, or even woody. *Samara* a compressed, dry Capsule, of 2 cells, without valves, often winged. *Folliculus* a leathery or woody Capsule, of one valve, bursting lengthwise, with marginal Seeds. *Coccum*, one portion of an aggregate, dry, elastic, bivalve Capsule, as in *Euphorbia*, and the Rutaceous order. An unnecessary term.

2. *Siliqua*, a Pod, a long, dry, solitary Seed-vessel of two valves, with an intermediate parallel single partition, whose edges bear the numerous Seeds. *Silicula*, a Pouch, is only a shorter or rounder *Siliqua*, with fewer Seeds.
3. *Legumen*, a Legume, a solitary Seed-vessel, of two valves, without any separate longitudinal partition, and bearing the Seeds along one of its margins only.
4. *Drupa*, a Stone-fruit, is fleshy, sometimes dry, containing one hard or bony Nut, of one or more cells, and as many kernels.
5. *Pomum*, an Apple, is fleshy, containing a Capsule, with several Seeds.
6. *Bacca*, a Berry, is fleshy, sometimes dry, containing one or more Seeds, enveloped with pulp.

B. composita, a Compound Berry, is composed of several single-seeded grains. *B. corticata*, a Thick-skinned Berry, has a firm rind, like the Orange, the Gourd, &c. *B. spuria*, a Spurious Berry, originates either in the Calyx becoming pulpy, like the Mulberry, and perhaps the Fig; the Corolla, as in *Commelina Zanonia*; the scales of a Catkin (53 : 3), as in *Juniperus*; or the Receptacle (63), as in the Strawberry, and perhaps the Yew.

7. *Strobilus*, a Cone, a Catkin (53 : 3) enlarged and hardened, lodging the Seeds; either naked between its scales; or in a sort of Capsule, connected with the base of each, more rarely stalked and distinct, as in Willows.

62. *Semina*, the Seeds, to the perfecting of which all the other organs are subservient. Each Seed consists of several parts.

1. *Embryo*, the Embryo or Germ (called *Corculum* by Linnæus) is the most essential of all, no seed being capable of vegetating if this part be defective, as happens chiefly for want of the assistance of the Pollen (58), if the latter be spoiled by wet, or otherwise hindered; though the Seed may outwardly appear sound. This part sends out the Root (7) downwards, and the *Plumula*, or bud of the Stem or Herbage (12), upwards.

2. *Cotyledones*, Cotyledons or Seed-lobes, closely attached to the Embryo, commonly two, rarely

more, in some tribes altogether wanting. They either ascend out of the ground, and perform for a while the office of Leaves (31), or remain buried, till they gradually decay.

3. *Albumen*, the White, a farinaceous, fleshy, horny, or almost stony, substance, destined to nourish the Embryo during the first stage of vegetation, till the Root can perform its office (7). The *Albumen* forms a separate body in Grasses, Palms, the Liliaceous tribe, and other monocotyledonous Plants, properly so called, though this substance itself, which makes up the chief bulk of such Seeds, is commonly taken for their Cotyledon. Becoming fluid, it is soon totally absorbed by the sprouting Embryo of these plants. In many dicotyledonous Plants the *Albumen* is likewise distinct from the Cotyledons, as the Nutmeg, where it is large and curiously eroded or sinuated; *Mirabilis*, *Polygonum*, and *Rumex*, where it is mealy and shapeless, inclosing the Embryo and Cotyledons; and some few Leguminous Plants (61 : 3), though in most of this last tribe it does not constitute a separate part, any more than in the Gourd family, the Walnut, and many others. In such, the albuminous matter is lodged in the substance of their Cotyledons; for it must be present in some mode or other, to supply the first food of the germinating Embryo. Gærtner distinguishes an organ by the name of *Vitellus*, or Yolk,

in Seeds, which appears to me always either a pair of subterraneous Cotyledons, or a part of the Embryo; see *Trans. of Linn. Soc. v.* ix. 204.

4. *Testa,* the Skin, either simple, or lined with a finer film, *Membrana,* contains, and gives a shape to, the foregoing parts, and in vegetation bursts irregularly. A pulpy Seed, *Semen baccatum,* is furnished with pulp between the *Membrana* and the outer Skin, as in *Jasminum*[*].
5. *Hilum,* the Scar, or point of attachment, at the base of every Seed, where all the internal parts meet, and through which they are nourished while growing.

Accessory, not essential, parts of a Seed are:

6. *Strophiolum,* the Crest, an occasional appendage to the Scar, of a glandular appearance, as in *Chelidonium,* and some Leguminous genera, *Ulex, Spartium, &c.*
7. *Pellicula,* the Pellicle, a thin close membrane; a downy covering; or a glutinous substance, not perceptible till the Seed is moistened, as in *Salvia verbenaca.*

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[*] M. Richard, who unnecessarily, I think, invents the term *Episperm* for the *Testa* of Gærtner, asserts this covering to be always simple, though he allows it to be formed of two membranes, with an intermediate vascular *parenchyma,* or pulp. Any person who examines the kernel of an Apple will surely, in every stage of its growth, find a double *Testa,* the outermost firmly coriaceous, the innermost membranous; nor are numerous instances, of the same kind, wanting, where the external *Testa* can by no means be taken for any thing else.

8. *Arillus*, the Tunic, a complete or partial covering, attached to the base only, more or less loose, or inflated, as in *Urania*, fig. 155, *Euonymus*, and the Mace of the Nutmeg. In *Oxalis* this part is elastic; yet perhaps a more genuine *Arillus* than in the true *Rutaceæ*, or the *Euphorbiæ*. See Jussieu's 81st and 96th orders.

9. *Pappus*, the Seed-down, a feathery, hairy, bristly, or membranous tuft, or crown, at the summit of a Seed, rarely at its base, most important in the Compound Flowers.

10. *Cauda*, a Tail, a terminal, often feathery or hairy, appendage, formed of the permanent Style (59).

11. *Rostrum*, a Beak, an elongation of a Seed-vessel, as in the *Geranium* tribe, or of a Seed, as in *Scandix*, fig. 210.

12. *Ala*, a Wing, a dilated membranous or coriaceous expansion, terminating or surrounding a Seed, or Seed-vessel, fig. 221, *c*.

63. *Receptaculum*, the Receptacle, the common base, or point of connexion, where all the parts of a Flower meet: as also the place of insertion of the Seeds (62) more particularly. The Receptacle of a Flower is the disk, or space between the Stamens (58) and Pistil (59); especially if the Germen be inferior. In Compound Flowers (68) the Common Receptacle, being either naked, hairy, scaly, or cellular, affords generic distinctions.

64. *Flos completus*, a Complete Flower, is furnished with both *Calyx* (53) and *Corolla* (54); without the former, it is *nudus*, naked; without the latter, *apetalus*, apetalous.

65. With respect to the essential organs of fructification; *Flos perfectus*, a Perfect, or United, Flower, bears Stamens (58) and Pistils (59) in the same individual. *Flores separati*, Separated Flowers, have Stamens in one, Pistils in another. This separation is absolute in Monœcious Flowers, where both kinds grow on the same plant, and in Diœcious ones, where they grow on two distinct plants, of the same species; but in Polygamous ones there are some Perfect Flowers, as well as Separated ones, on the same plant, or on different ones. Neuter or Abortive Flowers have both organs defective.

66. *Flos sterilis*, a Barren Flower, has Stamens only (65), and can consequently produce no Fruit or Seed.

67. *Flos fertilis*, a Fertile Flower, has Pistils only (65), but produces no Seed without the assistance of the Barren one (66).

68. *Flos compositus*, a Compound Flower, consists of numerous *Flosculi*, Florets, or partial flowers, in a Common Calyx, the *Anthers* (58) of each of such florets being united into a cylinder. The Corolla (54) of each floret is monopetalous (56), and either *tubulosa*, tubular, or *ligulata*, strap-shaped, flat.

69. ***Flos aggregatus***, an Aggregate Flower, consists of several Flowers, or Florets (68), with distinct Anthers, collected into one Common Calyx, as in *Scabiosa*, and all Amentaceous Flowers (53 : 3), as also most Grasses, and according to Linnæus, umbellate and even cymose flowers (48), which last we can scarcely admit, they being rather modes of Inflorescence.

70. Compound Flowers (68), as well as Aggregate ones (69), are either *flosculosi*, flosculous, or *radiati*, radiant, as already explained under *Umbella* (48 : 7).

71. Cryptogamic Plants, are those whose Flowers are either totally unknown, like Ferns (77); or not constructed according to the analogy of Plants in general, as above described, like Mosses (77): so that they cannot be referred to Classes and Orders by their Stamens and Pistils, as hereafter to be explained. Phænogamic Plants, on the contrary, have evident Flowers, constructed according to the above-described principles.

CHAPTER VI.

PRINCIPLES OF CLASSIFICATION.

72. EVER since Botany has assumed the form of a Science, Botanists have agreed that every principle of Classification must be deduced from the parts of fructification (52).

73. All botanists are also agreed, in distinguishing the Vegetable Kingdom into Classes, Orders, Genera, and Species.

74. Species are generally acknowledged to be permanently distinct, though liable to Varieties, and occasionally to the production of intermediate Species, by the access of the Pollen (58) of one, to the Stigma (59) of another; but such appear to have only a transient duration.

75. Genera, as far as they are rightly determined, are considered by Linnæus, and his scholars, as no less natural than Species (73), but this opinion is rejected by many botanists, especially of the French school, even while they contend for the existence of natural Orders.

76. Classes and Orders, which are assemblages of Genera (75), are either natural or artificial.

77. Natural Classes and Orders (76) are such as ap-

pear indicated by Nature herself. Some are very evident, as Grasses, Umbelliferous Plants, Compound Flowers, the Orchis tribe, Palms, Ferns, and Mosses. Others are more obscure, and many plants cannot yet be referred to any such Orders or Classes.

78. Artificial ones (76) are contrived for human convenience, to assist the memory, and to promote the determination and discrimination of plants. Such constitute the Linnæan system, founded on the Stamens and Pistils (58, 59); those of Tournefort and Rivinus upon the Corolla (54); and those of Ray, and several other authors, upon the Fruit (61) and Seed (62).

79. Linnæus first pointed out the distinction betwixt a Natural and an Artificial System; but Bernard de Jussieu and his nephew Antoine Laurent de Jussieu, first formed and published a Natural System, reduced to a regular form upon scientific principles.

80. Linnæus contended that human science was not yet competent to give definitions, or technical characters, of Natural Classifications.

81. Adanson indeed undertook this, and A. L. de Jussieu has founded his System, published at Paris in 1789, upon such characters; which though incomplete, and liable to various exceptions, is of great use as a key to a Natural Arrangement (79). In proportion however as it serves this purpose, and is dependent on definitions, it becomes in many

instances artificial, breaking natural affinities, or producing unnatural ones; defects inevitable in all such undertakings, from our imperfect acquaintance with the Vegetable productions of the whole globe.

82. In the Systematic arrangement of Plants, whether artificial or natural, some botanists consider one part of the fructification (49), others another part, more important than the rest.

83. As far as Artificial Classification (78) is concerned, this is little more than a matter of opinion; but the Linnæan System, as being founded on the number, situation, and proportion, of the Stamens and Pistils (58, 59), organs which must exist in some shape or other, has been found the most commodious, and has put aside every other.

84. Such a mode of arrangement answers the purpose of a dictionary, to find out plants by their characters, as words by their orthography.

85. There is scarcely a principle which can be assumed as universal, or without exception, in Natural Classification. *Number*, in the parts or divisions of each organ, proves often fallacious; *Insertion*, or the mode of connexion of the several organs, and their comparative situation, with regard to each other, is found far less exceptionable; *Structure*, or the different forms of the same organ, in different instances, is of very great moment.

86. Linnæus and Jussieu concur in considering as of primary importance the Structure (85) of the Em-

bryo (62 : 1), and the Cotyledons (62 : 2); and the former has declared that the number of the Cotyledons appeared to him to afford a sure basis, or primary source of discrimination for a Natural System. He soon found what he thought an exception in *Nymphœa*, but was deceived in that instance. The above principle, doubtless, is good, but some correction of the commonly received ideas and terms is become necessary, since the structure and economy of Seeds have been more closely investigated.

87. Gærtner and Jussieu have shown that the *Albumen* (62 : 3) advantageously serves in the natural arrangement and discrimination of Plants. This however is liable to as many exceptions, in the detail, as almost any other source of characters.

88. Plants with a simple undivided *Embryo* (62 : 1) are termed *Monocotyledones*, or monocotyledonous; the upper end of that organ being presumed to perform the necessary functions of a Cotyledon, with respect to air, in the earliest stage of germination. Hence the term in question may properly be retained, though originally meant to apply to the separate, and usually copious, *Albumen* of such plants, visible in Corn, Palms, &c.

89. Plants whose *Embryo* divides at the top into two parts or lobes, which are the Cotyledons (62 : 2), are named *Dicotyledones*, or dicotyledonous. In some few instances, as the Fir tribe, there are numerous Cotyledons; but such plants differ in no particular

of their economy from those which have only two, and are therefore comprehended under the same denomination.

90. Some Plants, especially those with anomalous or obscure fructification, have been judged *Acotyledones*, or destitute of a Cotyledon. The idea and the term are partly founded in error. Of some which have been thus considered, nothing is correctly known of the structure or germination of their Seeds, as *Fungi*, and Submersed *Algæ* (*Fuci*, *Confervæ*, &c.), nor has much been ascertained relative to the *Hepaticæ*, or the *Lichenes*. We know that their *Embryo* is of the most simple kind, without appearance of Cotyledons or *Albumen*, so that they appear to differ from the *Monocotyledones* (88) chiefly in the want of a separate *Albumen*, that nutritious matter being probably lodged in the substance of the *Embryo*, as it is in the Cotyledons of many of the *Dicotyledones* (62 : 3). But this is conjectural. *Musci*, Mosses, (77) properly considered, appear to agree with *Hepaticæ*, to which they are otherwise very closely allied, in having a simple *Embryo*, without either separate Cotyledons or *Albumen*. But they subsequently produce a peculiar accessory organ, consisting of several branched and jointed fibres, springing upwards or laterally, from the crown of the Root (7), and very distinct from its radicles. These fibres are taken by Hedwig for Cotyledons, which from their late forma-

tion they can scarcely be; and we may rather consider their nature and use as undetermined. They perhaps differ little from the woolliness so common on the Stem of these plants in an advanced state. *Filices*, Ferns, (77) differ somewhat from Mosses in having a membranous and flat expansion of the *Embryo*, sometimes fixed by the centre. Still this part may be considered as simple, and what are subsequently produced, however shapeless, are doubtless of the nature of Leaves, or Fronds (24), which in these plants are of a more Proteus-like, or mutable, figure than in any others. Ferns want the above-mentioned jointed fibres of Mosses in germination.

91. From what has been said (90) it appears that the old appellation of *Acotyledones* may commodiously remain with Cryptogamic vegetables in general (71), though the form of their *Embryo*, and mode of germination, are, in some of this tribe, only presumed from analogy. Those with which we are acquainted are certainly destitute of any Cotyledon, and of any separate *Albumen*.

92. Jussieu however ranks under this denomination an Order termed *Naiades*, consisting of aquatic plants, with perfect, not cryptogamic, fructification. Of many of these his knowledge, respecting the point in question, was incomplete, and he has candidly owned his difficulties. Most of the plants, on being better understood, prove either dicotyle-

donous, or monocotyledonous, and naturally range with their allies in other parts of the System.

93. Mr. Robert Brown, who has greatly illustrated the System of Jussieu, and the Natural Orders of Plants, has shown that in the *Monocotyledones* the number three, and its compounds, prevail in the several parts of fructification, insomuch that in Orders furnished with only one evident and perfect Stamen, there are rudiments of 2 others. So in the *Orchis* tribe, as I understand it at least, while there are 3 Calyx-leaves, the 2 Petals (55) and the solitary Nectary (57) make up the same number in the Corolla, fig. 70, 77.

94. In *Dicotyledones* the number five no less remarkably prevails, throughout the great bulk of the Vegetable kingdom, as is evident on the slightest inspection.

95. Jussieu and his followers attribute a Calyx only, no Corolla, to Monocotyledonous plants, however conspicuous, coloured, elaborate, or compound the integuments of the Flower (53, 54) may be. This proves most flagrantly paradoxical in the natural order of *Scitamineæ*, fig. 1; and it is evidently absurd that we must wait to name the obvious parts of a flower, till we have investigated the structure or germination of its seed. We allow indeed that the difficulty is lessened, though not infallibly removed, by Mr. Brown's rule respecting numbers (93, 94).

96. The insertion of the parts of a Flower, or in other words, the situation of the *Germen* (59), whether inferior or superior, with regard to the rest, next takes the lead in importance in Jussieu's system; and in the *Dicotyledones* the absence or presence, the number or divisions, of the Petals (55), afford even more leading, if not important, distinctions.

97. The terms used by Jussieu to indicate the above different insertions apply to the Stamens (58). Thus,

Stamina hypogyna are inferior, inserted beneath the Germen, fig. 14 and 16.

Stamina epigyna are inserted above it, fig. 11.

Stamina perigyna are inserted into the integuments of the Flower, which, if simple, is always denominated a Calyx (95) by this author, fig. 13; if otherwise, the Stamens are borne either by the Calyx, fig. 19, or the Corolla, fig. 8, 9. But such insertion never takes a lead in his system, unless it be into, what he at least considers as, a Calyx. The above terms apply likewise to the Corolla.

98. Characters derived from proportion, do not enter at all into the principles of Jussieu's classification, nor scarcely those founded on number, except so far as whether that of the Stamens or Pistils be definite or indefinite.

99. This System is confessedly incomplete, as there are numerous, even well-known, *Genera* (73, 75)

which cannot well be referred to any of his natural orders.

100. The same imperfection occurs in the Fragments of a Natural Method, left by Linnæus, and it is remarkable that the comparative number of such doubtful Genera is very similar in both these arrangements.

101. The foregoing observations concerning Classification, are also applicable to the Generic distinctions of plants; but in their latter application they are deduced from all, or any, of the seven parts of Fructification (52), according as each may afford the most clear and essential difference.

102. Generic Characters are of two kinds, the natural and the essential.

103. Natural Generic Characters are a concise, technical, but full description of the seven parts of Fructification of each Genus, in their natural order, as in sect. 52, so as to apply, as nearly as possible, to every known Species. Such are contained in the *Genera Plantarum* of Linnæus.

104. Essential Generic Characters consist of the striking and essential differences, between one Genus and another, in any one or more of those seven parts, with respect to insertion, structure, division, or any other permanent mark; such parts being disposed in each, according to their relative importance, for such discrimination, in the Natural Order to which the Genus in question belongs.

Characters of this kind are given in the *Systema Naturæ*, and *Systema Vegetabilium* of Linnæus, as well as in our *Flora Britannica*, and the *Genera Plantarum* of Jussieu. In the latter are subjoined, in a different type, various accessory or explanatory characters, of great value, respecting the herbage, or general habit, of every Genus.

105. These principles of Generic discrimination are equally stable and important, whether Genera be considered, with Linnæus, as natural assemblages; or with some other botanists, as commodious artificial contrivances.

106. It seems to me that the soundest most irrefragable Genera, have been established by those botanists who believed them to be founded in nature; those who think otherwise, being prone to recur to minute distinctions, of whose relative importance they have no principle by which they can judge,

107. While *Rosa, Rubus, Quercus, Salix, Ficus, Cypripedium, Epimedium,* and *Begonia* exist, it will be vain to deny that Generic distinctions are founded in nature, though botanists may, as yet, be very far indeed from having discovered them all correctly.

BIB. BODLEIANA

CHAPTER VII.

EXPOSITION OF THE LINNÆAN ARTIFICIAL SYSTEM, SOMEWHAT REFORMED.

THE Classes are 24, distinguished by the number, situation, proportion, or connexion of the Stamens (58).

The Orders, sub-divisions of the Classes (76), are founded on the number of the Pistils (59), or rather of the Styles, or Sessile Stigmas; or on the Fruit (61); or on the nature of the different Florets (68); or on some character of the preceding Classes; or lastly, in the 24th Class, on Natural Families.

The first eleven Classes are known solely by the number of Stamens, in each Perfect Flower (65).

1. Monandria. Stamen 1. fig. 1. *Globba marantina.*
2. Diandria. Stamens 2. — 2. *Veronica spicata.*
3. Triandria. ——— 3. — 3, 4. *Poa fluitans.*
4. Tetrandria. ——— 4. — 5, 6, 7. *Scabiosa arvensis.*
5. Pentandria. ——— 5. — 8, 9. *Epacris obtusifolia.*
6. Hexandria. ——— 6. — 10, 11. *Galanthus nivalis.*

7. Heptandria. Stamens 7. fig. 12. *Aesculus Hippocastanum.*

8. Octandria. ——— 8. — 13. *Daphne collina.*

9. Enneandria. ——— 9. — 14. *Butomus umbellatus.*

10. Decandria. ——— 10. — 15, 16. *Dianthus cæsius.*

11. Dodecandria. Stamens 12 to 15 or 19. fig. 17. *Reseda lutea.*

The two next depend on the situation, or insertion, of the Stamens.

12. Icosandria. Stamens 20 or more, inserted into the Calyx (53), fig. 18, 19. *Mespilus grandiflora.*

13. Polyandria. Stamens numerous, inserted into the Receptacle (63), fig. 20. *Capparis spinosa.*

The two following depend on the proportion of the Stamens.

14. Didynamia. Stamens 4, 2 uppermost longest, fig. 21, 22. *Lamium album.*

15. Tetradynamia. Stamens 6, 2 opposite ones shortest, fig. 23, 24. *Thlaspi Bursa-pastoris*, 25-27. *Teesdalia nudicaulis*, 28-31. *Cardamine amara.*

The five following are distinguished by some union of the Stamens to each other, or to the Pistil.

16. **Monadelphia.** Stamens combined by their Filaments (58) into one tube, or common base. fig. 31-35. *Geranium sylvaticum,* 36, 37. *Althæa officinalis.*

17. **Diadelphia.** Stamens combined by their Filaments into two parcels or sets, mostly in unequal numbers; those parcels sometimes combined at their base. fig. 38, 39. *Fumaria solida.* 40. *Spartium scoparium.* 41. *Ulex europæus.* 42-47. *Pisum maritimum.*

18. **Polyadelphia.** Stamens united into more than two parcels, by their Filaments. fig. 48-50. *Hypericum elodes.* 51, 52. *Stuartia pentagyna.* 53-56. *Melaleuca thymifolia.* 223. *Xanthochymus pictorius.*

19. **Syngenesia.** Stamens united by their Anthers into a tube. The Flowers moreover are compound (68). fig. 57-60. *Picris echioides.* 61-63. *Carduus nutans.* 64, 65. *Centaurea Cyanus.* 66-69. *Inula dysenterica.*

20. **Gynandria.** Stamens inserted into the Germen or Style (59). fig. 70-72. *Ophrys apifera.* 73-76. *Stylidium graminifolium.* 77-79. *Dendrobium linguiforme.*

The three next are known by a disunion of the Stamens and Pistils, the former being in one Flower, the latter in another, of the same species, such being denominated Separated Flowers (65).

21. MONOECIA. Stamens and Pistils in differen Flowers, on the same individual plant. fig. 80-84. *Quercus Robur.*

22. DIOECIA. Stamens and Pistils in different Flowers, on two separate plants. fig. 85-87. *Salix herbacea.* 88-91. *Populus alba.*

23. POLYGAMIA. Stamens and Pistils separate in some Flowers, united in others, either on the same plant, or on two or three different ones; such different Flowers being, moreover, dissimilar in their structure in some other respect. fig. 92-95. *Ficus Carica.*

24. CRYPTOGAMIA. Stamens and Pistils either imperfectly, or not at all, known, or not capable of being numbered with any precision. See tab. 7-9.

The *Palmæ* originally constituted an appendix to this system, because their Flowers were too little known to admit of arrangement by the Stamens and Pistils. But that difficulty is now almost entirely removed, and the Genera of this tribe are mostly found reducible to the 6th, 21st, or 22d Classes.

The Orders of the first 13 Classes, *Monandria* to *Polyandria* inclusive, are characterized solely by the number of the Styles, or sessile Stigmas, in each Perfect Flower (65). These Orders are more or less numerous in the several Classes, and are distinguished as follows:

MONOGYNIA. Style, or Sessile Stigma, 1. fig. 1, 2, 13, 20.
DIGYNIA. Styles, or Sessile Stigmas, 2. fig. 16.
TRIGYNIA. ———————— 3. fig. 19, 48.
TETRAGYNIA. ———————— 4. fig. 135.
PENTAGYNIA. ———————— 5. fig. 34, 51.
HEXAGYNIA. ———————— 6. fig. 14.
HEPTAGYNIA. ———————— 7. *Septas capensis.* Andr. Repos. t. 90.
OCTAGYNIA. ———————— 8. } scarcely ever occur.
ENNEAGYNIA. ———————— 9. }
DECAGYNIA. ———————— 10. *Neurada* and *Phytolacca.*
DODECAGYNIA. ———————— about 12. fig. 242.
POLYGYNIA. ———————— numerous. fig. 229.

These parts are seldom so numerous in any Flower as the Stamens, very rarely more so. There is usually an analogy between their respective numbers in the same flower.

The two Orders of the 14th Class are distinguished by the nature of the Fruit.

1. GYMNOSPERMIA. Seeds naked, usually 4, never more. fig. 22.
2. ANGIOSPERMIA. Seeds in a Pericarp (61), mostly very numerous. fig. 175.

The two Orders of the 15th Class are distinguished by the shape of their Pericarp.

1. Siliculosa. Fruit a *Silicula,* or Pouch (61:2). fig. 24.
2. Siliquosa. Fruit a *Siliqua,* or elongated Pod (61:2). fig. 30.

The various Orders of the 16th, 17th, and 18th Classes are characterized by the number of the Stamens, the Classes themselves being marked by their various modes of union. These Orders therefore bear the same appellations as the first 13 Classes.

The Orders of the 19th, or Compound-flowered, Class are marked by the Perfect, Separated, Barren, Fertile, or Abortive nature (65) of the Florets (68).

1. Polygamia-Æqualis. Florets all perfect, each having efficient Stamens and Pistil, and producing one Seed. fig. 57-63.
2. Polygamia-superflua. Florets of the disk perfect; those of the circumference, or radius, having a Pistil only: but both kinds forming perfect Seed. fig. 66-69.
3. Polygamia-frustranea. Florets of the disk perfect; those of the circumference with an abortive Pistil, or none at all. fig. 64, 65.
4. Polygamia-necessaria. Florets of the disk with Stamens only; those of the circumference with each a Pistil only.
5. Polygamia-segregata. Several Flowers, either simple or compound, but with united An-

thers, and a Proper Calyx, all included in one Common Calyx.

The 6th Linnæan Order, *Monogamia*, consisting of Simple Flowers, with united Anthers, is abolished, as being unnatural, and extremely uncertain. fig. 195 *b*.

The Orders of the 20th Class are distinguished by the number of their Stamens. *Gynandria Monandria*, fig. 70-72. *Tetrandria*, 73-76.

Those of the 21st and 22d by the same circumstance, or by any other character of the preceding Classes founded on the union of the Filaments.

The Orders of the 23d are,

1. MONOECIA. The two or three different descriptions of Flowers all on the same plant.
2. DIOECIA. The different descriptions of Flowers on two separate plants.
3. TRIOECIA. The same on three separate plants.

The Orders of the 24th Class are natural orders or families.

1. FILICES. Ferns. fig. 96-98. *Equisetum sylvaticum.* 99-101. *Aspidium Filix-mas.* 102-104. *Scolopendrium vulgare.*
2. MUSCI. Mosses. fig. 105-108. *Dicranum purpureum.* 109-113. *Hookeria lucens.*
3. HEPATICÆ. Liverworts. fig. 114, 115. *Jungermannia multifida.*
4. LICHENES. Lichens. fig. 116, 117. *Opegrapha scripta.* 118-120. *Lecanora murorum.* 121, 122. *Peltidea canina.*

5. ALGÆ. Flags. fig. 123-126. *Fucus natans.*

6. FUNGI. Mushrooms. fig. 129-133.

The 3d and 4th of these Orders are added since the time of Linnæus. The whole will be explained hereafter.

The difficulties, or exceptions, to which the above System is liable, are the following:—

Number in the parts of Fructification proves not always uniform in one Genus or Species, nor even in the same individual plant. In the latter case Linnæus teaches that the central, or terminal, Flower must be our guide, as in *Euonymus*, *Monotropa*, *Chrysosplenium*, and *Adoxa*. When a species is variable in the number of Stamens or Pistils, or if one or more species of any genus differ from the rest in those respects, such irregular species are to be named in a synoptical or analytical table at the head of the particular Class or Order to which they technically belong; though placed in due course, likewise, in the proper Class and Order of the Genus of which, independent of such artificial characters, they naturally form a part. The same plan is, of course, to be pursued with regard to any species, anomalous in other respects, as the dioecious ones of *Valeriana*, *Lychnis*, &c.

That this System sometimes puts widely asunder some genera naturally allied to each other (as a few with Ringent Flowers, that by their natural affinity belong to the 14th Class, placed in the 2d because they have only two Stamens), is no objection to it on the score of facility or convenience. It does not profess to be a natural arrangement; and if in many parts it proves so, more is performed than had been promised, or than could reasonably be expected. The 15th and 19th Classes are perfectly natural (except *Cleome*, badly placed in the former); as are, more or less, several Orders, or Sections of Orders, in other Classes.

Greater technical inaccurracy occurs relative to some characters, founded on connexion of parts. The Stamens, or Filaments, of several Papilionaceous genera, referred with their strictly natural allies, to *Diadelphia Decandria*, are perfectly monadelphous. fig. 40. We do not mean merely that their two sets of Stamens are united into one at the base; but there is really no distinction of two sets, in any part of their structure. Indeed if the ten Filaments are any way combined, in a Papilionaceous Flower, such is referred by Linnæus to the Class and Order just mentioned. If they are altogether distinct, in which case their whole configuration is totally dissimilar from the flat and membranous Filaments of the true *Diadelphia*, they belong, though Papilionaceous, to the 10th Class.

Culture, and other accidents, produce changes against which no principles of arrangement can provide. Such causes peculiarly affect *number* in the parts of a Flower, the Stamens, and Pistils, as well as the divisions of the Calyx and Corolla, being frequently multiplied by luxuriance of soil, to the great delight of florists, but much to the inconvenience of botanists. So also the Stamens and Pistils are often transformed to Petals, which constitutes a double Flower.

In the Classes with separated Flowers, accidents occur with regard to the situation of the Stamens or Pistils. If the structure of the other parts of the Flower be alike, in every individual, both these organs are liable to meet in the same Flower; just as, on the other hand, they occasionally are met with separate, in Classes, or in some Species of Genera, to which united Flowers naturally belong (65). Hence so great a proportion of trees in hot climates, as well as of grasses in all climates, are polygamous; having the characters of the 23d Class, as defined by its author Linnæus. But if respect be always had to the accessory parts of a Flower (53, 54), as well as the essential ones (58, 59), and those are found different in structure, number, or otherwise, such Flowers must remain permanently distinct. Such only would I admit into the Class *Polygamia*, by which measure botanists in tropical countries are relieved from one of the greatest of inconveniences.

I have even ventured to suggest, *Introd. to Botany*, ed. 3. 368, that the 21st, 22d, and 23d Classes of the Linnæan system might possibly be well reduced to one, under the name of *Diclinia* (already used by

Jussieu and some other writers), which might contain all genera with separated Flowers, whose accessory organs differ in any respect. This alteration has been adopted by an able practical botanist, whose experience had taught him to approve it, Mr. Frederick Pursh, in his *Flora Americæ Septentrionalis*, published in 1814. He has divided the Class *Diclinia* into the three following Orders.

1. SEGREGATÆ. Flowers not Amentaceous (53:3).
2. AMENTACEÆ. Barren Flowers, at least, in Catkins (53:3); the Fertile ones not always so. Fruit distinct from the Calyx. fig. 274, 275.
3. CONIFERÆ. Barren and Fertile Flowers in Catkins. Fruit a *Strobilus* or Cone, (61:7) fig. 276.

Under each Order of the Linnæan System, are disposed the Genera which belong to it, in a regular series, as nearly as possible according to their natural affinity to each other, with the Essential Character (104) of each. The Species are, in like manner, ranged, according to their affinities, under each Genus, with their Specific Characters. Synonyms are subjoined, with mention of the native country of each Species; after which follow occasionally compendious descriptions, with any useful remarks. Some large Genera are commodiously divided into Natural Sections, by leading characteristics of certain Species taken collectively.

At the head of every Class, all its Orders are enumerated; and under each Order its appropriate Genera are arranged, in a Synoptical or Analytical manner, according to their shortest, most technical, characters. In these, whatever part of the Fructification affords the most decisive or striking characters in each artificial Order or subdivision, takes the lead, the others following according to their importance. But in the above-mentioned Essential Characters (104), at the head of each Genus, the parts of Fructification, whence those characters are derived, should be disposed, as has already been observed, according to their relative importance in the particular Natural Order, or Series, to which such Genera belong.

These are the principles of arrangement which Linnæus appears to have laid down for himself, and upon which he gradually improved. But in the detail of his System he has not always kept them strictly in view; nor have his pupils, followers, or editors, paid the requisite attention to them, especially with regard to these intricate or recondite natural relationships, which few of these writers perhaps were competent to observe, and to which, it must be confessed, botanists of the old Linnæan school have generally paid too little attention.

Respecting Nomenclature, it is only necessary to remark, that every Genus should be distinguished by a name, either of Greek or Latin derivation, or formed out of the proper name of some botanist, worthy of such commemoration. Names of barbarous origin have, however, crept in, by the means of Linnæus himself, contrary to his own wise laws. Genera have also been dedicated to abundance of persons, who have no claim to this honour. Corrupt names, composed of other generic appellations, already established, though strictly and judiciously prohibited by all classical botanists, have here and there been introduced. Of these the worst of all are made up of two such established names as *Calamagrostis*. Future general writers on Botany, of competent authority, must reform these abuses. No authority can sanction their continuance. If any indulgence be admitted, it may perhaps be in favour of a few well-sounding generic names of barbarous origin; for there can be no question that Pliny, and even purer Latin writers, would have adopted such names, properly modified, had they treated of the new plants of foreign countries.

The generic name being fixed, each Species must also be designated by an appropriate concise appellation, of a single word if possible. This should be either a characteristic adjective, expressive of the character, aspect, colour, quality, or use of the Species; or of some substantive, not necessarily agreeing in gender with the generic name, and therefore always beginning with a capital letter, by which some circumstance in the history of the plant, or some synonym, may be recorded.

Important or permanent Varieties (74) may, with propriety, be noticed. These are conveniently marked with the Greek letters, numbers being reserved for Genera and Species.

It would be well for every person who undertakes to write a systematic work on Botany to consider these leading principles of Linnæus, and to study with care those more particular ones, laid down in his *Fundamenta Botanica*, as well as his *Philosophia* and *Critica*. If his rules be faulty or unnecessary, they should be expunged; but no good writer will transgress them through ignorance or neglect.

His principles for the distinction of Species should be studied and contemplated over and over again, by every person ambitious of permanent botanical fame, beyond the reach of the fashions of System. This department of Botany Linnæus justly terms *artis robur*, the strength, or sinews of the science. Species are perhaps the only distinctions which are indubitably natural; and to stamp them clearly, as well as concisely, is the most important, perhaps the most difficult, office of the philosophical botanist. No one yet has equalled Linnæus; nor has any one swerved from his rules, in theory or in practice, but for the worse. No intended improvement in this department has come under my inspection, that does not appear to me worse than indifferent. I speak with the greatest respect and deference for the authors of such projects, which it would be invidious to particularize, and which have, doubtless, been well intended. The more common faults in these compositions arise from negligence or inability, from a want of deep study of the subject, a confusion or inaccuracy of ideas, a feebleness of style or expression, or a want of command of language.

I have chosen to conclude this chapter with the subject of specific characters, because it is of the most fundamental importance, and the most difficult in practice. It is the only sure ground of what Linnæus justly declares as the test of a good botanist, the knowledge of the greatest number of Species. (*Phil. Bot. sect.* 256.) Now this knowledge, if merely empirical, can be but of little value or certainty. Its dignity and solidity must consist in an intimate acquaintance with the comparative or respective importance of different characters, in different orders, tribes, or genera of plants. Several general rules indeed may be given, but scarcely one of those is without exception; and particular rules apply to almost every natural assemblage throughout the vegetable kingdom. The latter are only to be attained by acute observation and great experience.

The 8th chapter of the *Philosophia Botanica* of Linnæus, entitled *Differentiæ*, contains a full display of the ideas of that great writer, the first who ever undertook to consider this matter in a philosophical light, or to lay down any rules for the guidance of others. We shall give an epitome of his principles, recommending his reasons and illustrations, in the chapter just cited, to the attentive consideration of the student, who, before he attempts to apply them to practice, should give his days and nights to the subject.

A *Differentia Specifica*, Specific Character, or as Linnæus usually called it *Nomen Specificum*, should comprehend such characters only as are requisite, or sufficient, to distinguish a plant from every other species of the same Genus. Such therefore is not a *description*, but a *difference*, and where only one Species exists, a *Differentia Specifica* is an absurdity. If it attempts to contrast the plant with the Species of any other Genus, it is fallacious and erroneous.

A Specific Character therefore is the essential peculiarity of the full description, or complete idea, of every plant, whether drawn out in detail, or existing in the mind of the author.

All accidental circumstances are necessarily to be excluded, such as Country, Situation, Duration, Economical Uses, the Name of the Discoverer, &c.

All marks universally variable are also to be omitted, among which are Colour, Smell, Taste, Size, Hairiness in general, Curling of Leaves, Doubling of Flowers, or any kind of Monstrosity.

The direction of the hairs of Plants, as on the Calyx and Flowerstalk in *Mentha* and *Myosotis*, the Stem of *Papaver*, and some other instances, not noticed by Linnæus, forms one exception to the above rule; and perhaps the presence or absence of a glaucous hue in the herbage is another.

Characters which presuppose any knowledge of other plants, even of the same Genus, in the reader; as well as any allusions to the rarity or frequency of a plant, are manifestly faulty.

The Root (7) often affords solid specific distinctions, but is not infallible; nor can it always, in cultivated plants, or in dried specimens, be examined, or preserved.

Stems (12) frequently afford clear and certain distinctions, in their forms, postures, angles, wings, or other particulars.

Leaves (30) abound in the most elegant and unexceptionable characters for specific discrimination, in their situation, form, division, surface, margin, veins, and even pubescence. But scarcely any one mark concerning them is absolute, throughout all plants whatever, and experience only can teach, in every case, what is most to be relied on.

Appendages (47) are usually very serviceable in specific characters, especially the Stipulas, as to their presence or absence, situation, form, or even duration.

Inflorescence (48) is declared by Linnæus to yield the best of all specific differences. *Phil. Bot. sect.* 279. The importance of the distinctions to be derived from hence is so great, that some botanists, especially of the French school, do not scruple to found some of their Generic Characters upon it. Even Linnæus is justly charged with having had recourse to the Inflorescence, in arranging the Genera of the Umbelliferous tribe (48:7), though the principle is disguised under the idea of an Aggregate Flower (69). Our great leader is the more censurable, as the Flowers and Seeds of those Plants, properly studied, afford all-sufficient Generic Characters.

The parts of Fructification themselves, so far as their differences do not enter into the Generic Characters, often display most excellent Specific marks. Such now and then serve to divide a genus into Sections; as the Petals in *Iris*, and the Styles in *Hypericum*.

The more concise a Specific Character, the better it is. As in philosophy, it is not allowed to recur to two causes for the explanation of any phænomenon, when one is sufficient, so if one idea will serve to distinguish a Species, no more should be admitted. If more be necessary, as is generally the case in large Genera, they should be so disposed and contrasted, in the several Specific definitions, as to strike the mind at once forcibly and distinctly. This cannot be done if characters be much extended. Linnæus has therefore limited each definition to twelve words. There is no magic in this number, but I believe it is seldom exceeded with any good effect. Much will depend, after all, on the wording and construction of the sentence. A weak character of half a dozen words may be puzzling and insufficient; while a much longer may be clear, and readily conceived as well as compared, at one view.

All the terms and definitions should be precise, literal, and unambiguous. They are not allowed to be expressed in the comparative degree, though sometimes admitted, of late, in the superlative. They must be positive, not negative; devoid of obscure comparisons; contain no adjective but what follows its substantive; no article, connecting particle, or parenthesis.

Linnæus has adopted an arbitrary mode of punctuation in Specific Characters, in which the usual power of the different signs is reversed. He uses a Comma (,) to separate the different parts of the plant which come into the Specific Character. This is most frequently wanted, as between the Stem and Leaves and Inflorescence, if they all happen to occur. A Semicolon (;) separates two descriptions of the same organ, as Radical Leaves from the rest. A Colon (:) is introduced between the several parts or divisions of any one organ, as the segments, margin, or veins of a Leaf. A Period (.) of course, as usual, closes the sentence. The intention of this method seems to be, to lead the mind to a longer pause, in proportion as the parts under consideration are most nearly related. To practise it quite correctly requires more attention than is usually bestowed; and even Linnæus, or his printer, makes frequent, though not very serious mistakes. The following examples are correct:—

Biscutella *siliculis glabris, foliis lanceolatis serratis.*

Dentaria *foliis inferioribus pinnatis; summis simplicibus.*

Cardamine *foliis pinnatis: foliolis quinis incisis.*

Melochia *floribus umbellatis axillaribus, capsulis pyramidatis pentagonis: angulis mucronatis, foliis tomentosis.*

Those who describe new plants would do well, in general, to keep in view the laws of Specific distinction in their names likewise, though with less strictness; avoiding always what is trifling, incorrect, or erroneous; and selecting what may best impress the imagination, or assist the memory. No name whatever should be considered as of any authority, unless printed by some author who gives at the same time a specific character; though a judicious writer will always adopt what has, by any means, been received by the publick, if it be not materially objectionable.

CHAPTER VIII.

EXPOSITION OF THE NATURAL SYSTEM OF JUSSIEU.

The Classes are 15, not distinguished by any particular appellations. One of them is Acotyledonous (90, 91); three are Monocotyledonous (88); the remaining eleven Dicotyledonous (89).

The Orders are 100, distributed in natural series under every Class, and each defined by rather full definitions, taken, in the first place, from the parts of Fructification (52), and illustrated by secondary characters, founded on any other circumstance.

The Genera stand, in one or more sections, according to their respective affinities, and with their Essential Characters (104) under each Order, at the end of which are usually many valuable critical remarks.

There is at the end a very large assemblage of *Plantæ incertæ sedis;* Genera not reducible to any of these Orders. These are, for convenience, artificially arranged, by the *Corolla* (whether monopetalous, polypetalous, or wanting), the situation of the Germen, and the number of Styles and Stamens. Many of the Genera have subsequently been reduced to their proper Orders.

INDEX TO JUSSIEU'S CLASSES.

ACOTYLEDONES (90)				Class 1.
MONOCOTYLEDONES (88)		Stamens hypogynous (97)		2.
		perigynous		3.
		epigynous		4.
DICOTYLEDONES (89)	apetalous (64)	Stamens epigynous		5.
		perigynous		6.
		hypogynous.		7.
	monopetalous (56)	Corolla hypogynous (97)		8.
		perigynous		9.
		epigynous	anthers combined	10.
			anthers distinct	11.
	polypetalous (56)	Stamens epigynous		12.
		hypogynous		13.
		perigynous		14.
	diclines (see p. 49) irregular			15.

SERIES OF THE ORDERS.

CLASS 1.
1. *Fungi.*
2. *Algæ.*
3. *Hepaticæ.*
4. *Musci.*
5. *Filices.*
6. *Naiades.*

CLASS 2.
7. *Aroideæ.*
8. *Typhæ.*
9. *Cyperoideæ.*
10. *Gramineæ.*

CLASS 3.
11. *Palmæ.*
12. *Asparagi.*
13. *Junci.*
14. *Lilia.*
15. *Bromeliæ.*
16. *Asphodeli.*
17. *Narcissi.*
18. *Irides.*

Class 4.

19. *Musæ.*
20. *Cannæ.*
21. *Orchideæ.*
22. *Hydrocharides.*

Class 5.

23. *Aristolochiæ.*

Class 6.

24. *Elæagni.*
25. *Thymeleæ.*
26. *Proteæ.*
27. *Lauri.*
28. *Polygoneæ.*
29. *Atriplices.*

Class 7.

30. *Amaranthi.*
31. *Plantagines.*
32. *Nyctagines.*
33. *Plumbagines.*

Class 8.

34. *Lysimachiæ.*
35. *Pediculares.*
36. *Acanthi.*
37. *Jasmineæ.*
38. *Vitices.*
39. *Labiatæ.*
40. *Scrophulariæ.*
41. *Solaneæ.*
42. *Boragineæ.*
43. *Convolvuli.*
44. *Polemonia.*
45. *Bignoniæ.*
46. *Gentianæ.*
47. *Apocineæ.*
48. *Sapotæ.*

Class 9.

49. *Guaiacanæ.*
50. *Rhododendra.*
51. *Ericæ.*
52. *Campanulaceæ.*

Class 10.

53. *Cichoraceæ.*
54. *Cinarocephalæ.*
55. *Corymbiferæ.*

Class 11.

56. *Dipsaceæ.*
57. *Rubiaceæ.*
58. *Caprifolia.*

Class 12.

59. *Araliæ.*
60. *Umbelliferæ.*

Class 13.

61. *Ranunculaceæ.*
62. *Papaveraceæ.*
63. *Cruciferæ.*
64. *Capparides.*
65. *Sapindi.*
66. *Acera.*
67. *Malpighiæ.*
68. *Hyperica.*
69. *Guttiferæ.*
70. *Aurantia.*
71. *Meliæ.*
72. *Vites.*
73. *Gerania.*
74. *Malvaceæ.*
75. *Magnoliæ.*
76. *Anonæ.*
77. *Menisperma.*
78. *Berberides.*
79. *Tiliaceæ.*
80. *Cisti.*
81. *Rutaceæ.*
82. *Caryophylleæ.*

Class 14.

83. *Sempervivæ.*
84. *Saxifragæ.*
85. *Cacti.*
86. *Portulaceæ.*
87. *Ficoideæ.*
88. *Onagræ.*
89. *Myrti.*
90. *Melastomæ.*
91. *Salicariæ.*
92. *Rosaceæ.*
93. *Leguminosæ.*
94. *Terebintaceæ.*
95. *Rhamni.*

Class 15.

96. *Euphorbiæ.*
97. *Cucurbitaceæ.*
98. *Urticæ.*
99. *Amentaceæ.*
100. *Coniferæ.*

CLASS 1. ACOTYLEDONES.

Embryo destitute of Cotyledons, as well as of a separate Albumen.

Ord. 1. FUNGI. Tab. 9. fig. 129-133. "Either parasitical, or springing from the ground naked, or inclosed in a splitting *Volva* (53 : 7). Substance in some corky, or toughly coated; in others softer, fleshy, or mucilaginous. Some are simple, others branched; some spherical; several have a Head, *Pileus*, either stalked or sessile, sometimes orbicular and peltate; sometimes semi-orbicular, and laterally attached. Leaves and Flowers are wanting; but there is in the place of Anthers (58) a scattered, external or internal, powder. The place of Pistils (59) is supplied by organs variously constructed, resembling thin plates, wrinkles, furrows, pores, tubes, scales, fibres, &c.; in which, in some manner or other, are lodged bodies, that germinate in the earth like Seeds (62), or take root like creeping shoots, and reproduce the plant. The corky *Fungi* are perennial, and often parasitical; the rest either parasitical or terrestrial, short-lived, prone to putrefaction."

Such is the substance of Jussieu's character of this Order. We have no doubt that *Fungi* are propagated by real Seeds, though increased also, like other plants, by their fibrous Radicles (7).

Ord. 2. ALGÆ. Tab. 8, 9. fig. 116-128. "Various in habit, texture, substance, and organs of propagation.

Some are filamentous, some gelatinous like *Fungi;* some coriaceous or crustaceous; some herbaceous, in a manner leafy, and more akin to other plants. Organs analogous to Stamens and Pistils are in some altogether unknown, in some more conspicuous, and in others well known, differing greatly among themselves as to structure and situation."

This Order consists chiefly of Submersed *Algæ*, fig. 123-128, and *Lichenes* (90), fig. 116-122, with which a few *Fungi* are confounded. The "well-known" fructification is attributed to the *Lichenes*, in which however scarcely more than the Seeds have been ascertained. These generally are 8 together, in separate tubular parallel vertical cells, sunk in a horizontal or convex disk, exactly as in some *Fungi*, particularly the genus *Peziza;* a coincidence too little noticed.

Ord. 3. HEPATICÆ. fig. 114, 115. Herbaceous, creeping, many-rooted plants inhabiting damp places, whose Fructification is monoecious or dioecious, apparently of a various and complex nature, but not perfectly understood. The Seeds are often attached to elastic fibres, and send out Radicles from underneath.

Jungermannia, *Marchantia*, &c. are examples.

Ord. 4. MUSCI. fig. 108-113. True Mosses (90), whose Fructification, as now well understood from the investigations of Hedwig, is generally monoecious. The Barren Flowers (66) consist of an indefinite number of jointed tubular bodies, discharging a volatile Pollen (58); the Fertile ones (67) are generally several together, though scarcely more than one produces Fruit. Their Germen (59), at first sessile, is covered with a membranous *Calyptra*, or Veil, in the place of a *Corolla*, whose summit admits the Pollen. The ripening Pericarp (61) is generally elevated on a *Pedicellus* (22), and carries up the Veil, torn from the base, along with it. The Fruit is a Capsule (61:1), opening by a Lid; its margin either naked, or variously fringed with a determinate number of hygrometrical teeth, in a single or double row, affording good Generic distinctions (101). The Seeds are minute and innumerable, but have been proved such by germination. *Musci* are herbaceous, leafy, mostly branched; their Leaves continuous (46), pellucid and often reticulated. *Roots* abundantly fibrous; annual or perennial. Few plants are more tenacious of life, or revive more readily after drying.

Examples of genera without a Fringe (*Peristomium*) are *Sphagnum* and *Gymnostomum;* with a single Fringe, *Grimmia* and *Dicranum*, fig. 108; with a double one, fig. 112, *Bryum*, *Hypnum*, &c.

Ord. 5. FILICES. Ferns (90) fig. 96-104. Nothing is known of their Fructification but the Capsules, fig. 101, 104; situated either on the back of the Frond (24) and composing *Sori*, fig. 100, 102, 103, (53:2), with, or rarely without, a membranous Involucrum, fig. 100, 103; or in Spikes, fig. 96, (48:3) which seem transformations of the Frond or its segments (90). The most usual form of their Pericarp

(61) is a stalked globular Capsule, fig. 101, 104, of two valves, either naked, or bound by a transverse elastic ring. Seeds very minute, readily germinating, and so abundant, that many a species, if its possible increase were uninterrupted for 20 years, might cover the whole earth. The forms and situations of the *Sori*, and the direction in which the Involucrum separates, afford generic characters, unknown when Jussieu published.

Polypodium has no Involucrum; *Aspidium* a rounded one; *Pteris* a continuous one, separating inward; *Lindsaea* the reverse.

Ord. 6. NAIADES. "Calyx either entire or divided, superior or inferior, rarely wanting. Stamens definite, perhaps perigynous (97). Germen superior or inferior, solitary or four-fold. Style 1, rarely 2, to each Germen, or wanting. Stigma one or several. Seeds solitary, or several, either naked and superior, or inclosed in a Pericarp which is either superior or inferior. Leaves mostly opposite or whorled. Flowers in some perfect (65), in others monoecious or dioecious. Plants all herbaceous, and, except *Saururus*, aquatic." The uncertainty of this Order has been already noticed, (92), and the characters, above given, have so many ambiguities as to amount scarcely to any thing. The Genera are, *Hippuris*, fig. 252, *Chara*, *Ceratophyllum*, *Myriophyllum*, fig. 251, *Naias*, *Saururus*, *Aponogeton*, fig. 134, *Potamogeton*, fig. 135, *Ruppia*, *Zannichellia*, *Callitriche* and *Lemna*, fig. 136. *Naias*, *Lemna*, and *Chara*, are judged by Mr. Brown to be akin to his *Hydrocharideæ*, Prodr. N. Holl. v. 1. 345. See some of the rest in Ord. 88.

CLASS 2. MONOCOTYLEDONES, WITH INFERIOR STAMENS (97).

"*Calyx necessarily inferior, if present. Corolla none. Stamens often definite, rarely indefinite. Germen simple. Style* 1, *or many, or wanting. Stigma simple or divided. Seed* 1, *naked or covered, or Fruit of one cell, with* 1 *or many Seeds. Leaves mostly alternate and sheathing. Flowers occasionally becoming separated* (65), *by the imperfection of one or other organ.*"

Ord. 7. AROIDEÆ. "*Spadix* simple, many-flowered, either encompassed with a *Spatha* (53 : 4), or naked. Proper Calyx none, or simple. Stamens and Germens inserted, either separately or intermixed, into the Spadix. Style 1 to each germen, or wanting. Stigmas simple. Fruit of 1 cell, with 1 or many Seeds. Embryo in the centre of a fleshy Albumen. Leaves sheathing, alternate, generally all radical. Plants rarely caulescent; some of them very irregular in the arrangement of their Stamens and Pistils. Their germination is not well known." The Genera are *Zostera*, *Arum*, *Calla*, *Pothos*, *Acorus*, fig. 137, and others.

Ord. 8. TYPHÆ. "Flowers monoecious; barren ones aggregate, triandrous, with a 3-leaved Calyx; fertile ones also aggregate, with a 3-leaved Calyx, a superior Germen, simple Style, and 1 Seed. Leaves all alternate, sheathing. Aquatic herbs."

Typha, fig. 138, and *Sparganium*. Mr. Brown unites this Order and the *Aroideæ*.

Ord. 9. CYPEROIDEÆ. "Fl. united, or monoecious; each with a Scale in the place of a Calyx, nor is there generally any other. Stamens 3. Germen 1. Style 1. Stigmas 3, rarely but 2. Seed 1, either naked, or tunicated (62 : 8); sometimes surrounded at the base with bristles, or soft hairs. Embryo and germination as in the next Order. The single-flowered Scales are crowded into Spikes, or Tufts (48 : 5), variously disposed, some of them empty, the flowers being abortive. Stems or Culms (16) round or triangular, seldom jointed. Floral Leaves sessile; the rest sheathing, with an entire Sheath."

Carex, fig. 139, 79, *Eriophorum*, *Scirpus*, fig. 140, *Cyperus*, &c. a tribe much increased by Mr. Brown in *Prodr. Nov. Holl.* v. 1. 212.

Ord. 10. GRAMINEÆ. Grasses, fig. 3, 4, 141. "Glume (53 : 5) (Calyx of Linnæus) of 2 valves, rarely of 1, or of many, or wanting, either single-flowered, or containing 2, or more, Flowers, or Florets, in a two-ranked Spikelet (48 : 3). Each Flower has a Calyx (Corolla of Linnæus) resembling the Glume, mostly of 2 valves, rarely of 1, or wanting, the outermost either awned or not (53 : 5). Stamens generally 3, rarely 2, 6, or 1, in *Pariana* of Aublet 40. Anthers oblong, cloven at each end. Germen 1, with 2 little scales at the base, not always obvious. Styles mostly 2, each with a feathery Stigma; in some the Style is solitary, with a simple or divided Stigma. Seed in both instances solitary, either naked, or frequently covered with the permanent hardened inner valve of the Calyx (Corolla of Linnæus). Embryo small, attached laterally to the base of a much larger farinaceous Albumen. The lobe of the Embryo, in germination, remains with the annexed Albumen, sessile, connected at one side with the primary sheath which surrounds the *Plumula* (62 : 1). Roots fibrous, capillary. Culms cylindrical, either hollow or pithy, knotty or jointed; generally herbaceous, and unbranched. Leaves alternate, simple and undivided, springing solitary from each knot, sheathing; the Sheath split down to the knot. Flowers either tufted, or spiked along a linear Receptacle or *Rachis*, or panicled; concealed while young in the sheath of the uppermost Leaf. Some species become, by abortion, monoecious."

A great and well-known family, distributed into 13 sections, by the number of the Styles, Stamens, and Florets. Examples are, *Anthoxanthum; Alopecurus, Panicum, Agrostis; Holcus; Cenchrus, Rottbollia; Aira, Melica; Dactylis; Sesleria, Elymus, Triticum; Bromus, Poa*, fig. 3, 4, *Briza, Arundo; Oryza, Ehrharta; Nardus, Apluda, Zea; Pharus, Cornucopiæ, Coix*, fig. 141; *Nastus; Pariana.* "The habit, chaffy flower, single seed, mealy albumen, situation of the embryo, and mode of germination, render this Order peculiarly distinct."—*Jussieu.*

CLASS 3. MONOCOTYLEDONES, WITH PERIGYNOUS STAMENS (97).

" *Calyx of* 1 *leaf, tubular, or deeply divided, superior or inferior, sometimes naked, but mostly subtended by a single- or many-flowered Spatha* (53 : 4), *rarely with an Involucrum resembling an outer Calyx. Corolla none*, (what Tournefort, Linnæus, and others call so, being Jussieu's Calyx). *Stamens mostly definite, inserted into the base or the top of the Calyx* (Corolla), *opposite to its segments ; their Filaments distinct, rarely combined ; Anthers distinct, of* 2 *cells. In a few the Germens are several, superior, with as many Styles or Stigmas. Capsules as many, either of* 1 *cell, with* 1 *Seed, or internally of* 2 *valves, with numerous Seeds inserted into their margins. Most have a single, superior or inferior, Germen ; with* 1, *rarely* 3, *Styles or sometimes none ; and a simple or divided Stigma. Fruit pulpy, or capsular, of* 3 *cells, with* 3 *or many Seeds ; sometimes only* 1 *cell, or* 1 *Seed, coming to perfection. In the Berried fruits* (61 : 6) *the Seeds are inserted into the inner angle of each cell ; in the Capsules, usually of* 3 *valves, they stand on the edge of an elevated Receptacle* (63), *constituting the partition, from the middle of each valve, and separating therewith. Embryo small, in a rather large horny Albumen."*

Ord. 11. PALMÆ. The Palm tribe, fig. 142. " Calyx (Corolla *Linn.*) in 6 deep segments, often permanent; 3 outermost often smallest. Stamens 6, rarely more or fewer, inserted into the base of its segments, or rather perhaps into a glandular body under the Germen," (this last opinion is confirmed by Roxburgh and Salisbury,) "their Filaments often united at the base. Germen superior, mostly simple. Style 1 or 3. Stigma simple or 3-cleft. Fruit a Berry, or fibrous Drupa, of 1 or 3 cells, and 1 or 3 bony Seeds. Embryo very small, in a dorsal or lateral cavity, rarely in the base, of a large Albumen, which is at first tender and eatable, finally horny. Stem simple, usually lofty, round, formed without concentric circles (31), and scaly or fibrous from the remains of Footstalks (23). Leaves in a terminal tuft, alternate, sheathing, folded when young; (their Bud (26) perennial, but never renewable). Flower-stalks generally much branched, invested with one large common Sheath, and many partial ones, or Bracteas, in pairs. Flowers mostly Hexandrous, sometimes Monoecious, Dioecious, but more frequently Polygamous (65)." Palms are very long-lived, generally tropical, some of them affording valuable food for man in a state of nature.

The Leaves are pinnate in *Phœnix*, *Areca*, *Cocos*, *Caryota*, &c.; palmate in *Corypha*, *Borassus*, *Chamærops*, &c.

Ord. 12. ASPARAGI. "Calyx (Corolla *Linn.*) regular, in 6 segments, mostly inferior. Stamens 6 inserted therein. Germen simple; Styles 1 or 3; Stigma simple or three-cleft. Fruit pulpy, rarely capsular, of 3 cells. Seeds few, or solitary. Embryo at the scar of a horny Albumen. Stem often herbaceous. Leaves alternate, (simple, undivided); seldom opposite or whorled. Flowers each with a scaly Bractea, occasionally dioecious, sometimes deprived of a third, or gaining a fourth, in the number of their parts."

Sect. 1. Fl. united. Germen superior. *Dracæna, Asparagus, Medeola, Paris*, fig. 143, *Convallaria*, fig. 144, &c.

Sect. 2. Fl. dioecious. Germ. sup. *Ruscus, Smilax, Dioscorea.*

Sect. 3. Fl. dioecious. Germ. inferior. *Tamus, Rajania.*

Mr. Brown removes *Asparagus* and *Dracæna*, with some of their allies, to *Asphodeleæ* or *Asphodeli*, Ord. 16.

Ord. 13. JUNCI. "Calyx inferior, in 6 deep segments, the 3 inner ones sometimes larger and petal-like, sometimes all 6 are glumaceous (53 : 5). Stamens usually 6. Germen in some simple, with one Style, and a Capsule of 3 valves with central partitions, bearing the Seeds: or several, 3 or 6, rarely many, each with 1 Style and Stigma; becoming so many Capsules, with 1 or many Seeds. Embryo, in some at least, at the scar of a horny Albumen. Herbs, with (simple,) alternate, sheathing Leaves; the upper and floral ones sessile. Flowers with sheath-like Bracteas."

Eriocaulon, *Restio*, *Xyris*, *Aphyllanthes*, *Juncus*, fig. 145, *Commelina*, and *Tradescantia* exemplify the Genera with a simple germen; *Butomus*, fig. 14, *Alisma*, *Sagittaria*, *Scheuchzeria*, *Triglochin*, *Narthecium*, *Veratrum* and *Colchicum* those with a compound one. This is a paradoxical Order to a beginner, and has been much altered by Mr. Brown, who has separated from hence his *Restiaceæ*, *Commelineæ*, and *Melanthaceæ*, certainly with great advantage.

Alisma and *Triglochin*, with *Potamogeton*, see Ord. 6. enter his *Alismaceæ*, Prodr. N. Holl. v. 1. 342.

Ord. 14. LILIA. "Calyx (Corolla, *Linn.*) inferior, coloured, in 6 deep divisions, mostly equal and regular, bearing the Stamens from their lower part. Germen simple. Style 1. Stigma 3-cleft. Capsule of 3 cells and 3 valves, containing numerous, generally flat, Seeds, in 2 rows in each cell. Stem herbaceous, rarely shrubby. Leaves (simple and undivided), sheathing or sessile, alternate, or incorrectly whorled. Flowers often drooping, the Style longer than the Stamens (Linn.), either naked, or subtended by a Leaf or Sheath; generally splendid in aspect and colour."

Tulipa, fig. 146, *Erythronium*, *Gloriosa* (*Methonica*, Juss.) *Uvularia*, *Fritillaria*, *Lilium*, and *Yucca*.

Ord. 15. BROMELIÆ. "Calyx in six divisions, 3 alternate segments often largest, superior or inferior. Stamens 6, inserted into its middle, or base, or into glands proceeding therefrom and lying on the Germen, which is simple, with 1 Style, and a three-cleft Stigma. Fruit of 3 cells, either pulpy and not bursting, or capsular, of 3 valves, with 1 or several Seeds in each cell. Leaves sheathing, usually all radical. Flowers spiked, panicled, or corymbose, each accompanied by a Sheath or Bractea."

Sect. 1. Germen superior. *Burmannia* and *Tillandsia*, (the former thought more allied to *Junci* by Mr. Brown), also *Puya* of Molina.

Sect. 2. Germen inferior. *Xerophyta*, *Bromelia*, and *Agave*, fig. 147. Jussieu himself seems dissatisfied with this Order, whose germination is not thoroughly known.

Ord. 16. ASPHODELI. "Calyx (Corolla *Linn.*) inferior, coloured, most frequently in 6 deep equal divisions; sometimes tubular and undivided below. Stamens 6, inserted into its middle or base. Germen simple. Style 1. Stigma simple or 3-cleft. Capsule of 3 cells and 3 valves, with many Seeds. Root in most instances bulbous, bearing a *Scapus* (17); if fibrous, it often produces an herbaceous Stem. Leaves sheathing, alternate, often all radical. Spike, or Cluster, simple or branched, with a Sheath, or membranous Bractea, under each branch and flower. Flowers terminal, rarely axillary; in *Allium* umbellate," as well as in the new genus *Sowerbæa*, fig. 149, Sm. Tr. of Linn. Soc. v. 4. 218.

Aletris, *Aloe*; *Anthericum*, *Asphodelus*; *Eucomis*, *Hyacinthus*, *Lachenalia*, *Massonia*; *Albuca*, *Scilla*, *Ornithogalum*; *Allium* and *Sowerbæa*, fig. 149, exemplify this Order, which is much enlarged by the discoveries of Mr. Brown and others in New Holland; especially as the learned botanist last named refers hither some of the *Asparagi*, Ord. 12; even *Asparagus* itself, with *Dianella* of Lamarck, &c.

Ord. 17. NARCISSI. "Calyx (Corolla *Linn.*) superior, in some inferior, coloured; tubular at the base; limb in 6 deep, mostly equal, segments. Stamens inserted into the tube, their filaments rarely combined at the bottom. Germen simple. Style 1. Stigma 3-lobed or simple. Capsule of 3 cells, and 3 valves, with many Seeds; *Hæmanthus* only having a Berry, with but 3 Seeds. Root in general bulbous. Leaves radical, sheathing. Flowers terminating a *Scapus* (17), solitary or umbellate, with a common membranous Sheath, *Spatha* (53 : 4), either simple or divided."

Sect. 1. Germen superior. *Gethyllis*, *Bulbocodium*, *Hemerocallis*, *Agapanthus*, *Crinum*, and *Tulbaghia*. These, except the first, constitute the *Hemerocallideæ* of Brown, along with *Blandfordia*, fig. 148, Sm. Exot. Bot. 5. t. 4, and some of Jussieu's *Asphodeli* with a tubular flower; but Mr. Brown himself is disposed to consider this new assemblage rather as a section of the *Lilia*, Ord. 14.

Sect. 2. Germen inferior. *Hæmanthus*, *Amaryllis*, *Pancratium*, *Narcissus*, fig. 150, *Leucoium* and *Galanthus*, fig. 10, 11. These are Mr. Brown's *Amaryllideæ*, Prodr. Nov. Holl. v. 1. 296.

Sect. 3. The following are mentioned by Jussieu, as not perfectly answering to either section. *Hypoxis*, *Pontederia*, *Polyanthes*, *Alstroemeria*, *Tacca*. The last, a singular tropical East Indian genus, is considered by Mr. Brown as intermediate between the *Aroideæ*, Ord. 7, and *Aristolochiæ*, Ord. 23.

Ord. 18. IRIDES. "Calyx (Corolla *Linn.*) superior, coloured, tubular at the base, the limb in 6, more or less deep, equal or unequal, regular or irregular, segments. Stamens inserted into the tube, opposite to 3 alternate segments of the limb, their filaments rarely united into a cylinder round the Style, which is always solitary, with a three-fold, often subdivided, Stigma. Capsule of 3 cells and 3 valves, with many, generally roundish, Seeds. Root fibrous, or tuberous, or a solid bulb. Stem herbaceous, leafy, rarely almost wanting. Leaves alternate, sheathing, generally sword-shaped; *ensiformia*. Flowers attended by membranous Sheaths, often of 2 valves, 1 or more Flowers in each Sheath."

Sect. 1, Stamens monadelphous. *Galaxia*, *Sisyrinchium*, fig. 151, *Tigridia*, and *Ferraria*.

Sect. 2. Stamens distinct. *Iris*, fig. 152, *Moræa*, *Ixia*, *Watsonia*, *Gladiolus*, *Antholyza*, *Witsenia*, *Crocus*.

Sect. 3. The following, "akin to the *Irides*," *Xi-*

phidium, *Wachendorfia*, *Dilatris*, fig. 153, and *Argolasia*, (Schreber's *Lanaria*, Gen. Pl. 799,) most of them enter Mr. Brown's well-founded Order, entitled *Hæmodoraceæ*, Prodr. N. Holl. v. 1. 299. The true *Irides* (*Ensatæ* of Linn.), a most natural Order, are very ably illustrated, and their genera better distinguished than before by Mr. Ker Bellenden, in Sims and Kon. Ann. of Bot. v. 1. 219, whose ideas are adopted by Mr. Dryander, in Ait. Hort. Kew. ed. 2. v. 1.

CLASS 4. MONOCOTYLEDONES, WITH EPIGYNOUS STAMENS (97).

"*Calyx of one leaf, superior, tubular, or deeply divided. Corolla none*, as in Cl. 3;" (unless, like Linnæus, and all but Jussieuan botanists, we consider as such those internal coloured dilated integuments, manifestly analogous to the Petals of all other plants.) "*Stamens definite. Style either solitary, or wanting, rarely (if ever) multiplied. Stigma simple or divided. Fruit of* 1 *or several cells, pulpy or capsular.*"

Ord. 19. MUSÆ. "Calyx (Corolla *Linn.*) superior, in 2 deep, simple, or lobed, segments. Stamens 6, upon the Germen; some of them occasionally imperfect. Style simple. Stigma sometimes divided. Fruit of 3 cells, with one or many Seeds in each. Embryo in the hollow of a farinaceous Albumen. Stem herbaceous, though in size often arborescent, mostly clothed with the sheathing Footstalks. Leaves alternate, sheathing, convolute when young; their simple mid-rib sending off at each side innumerable, transverse, or obliquely parallel, ribs. Flowers on a common stalk, from the central leaves, in alternate Clusters, each Flower and Cluster attended by a Sheath."

Musa, *Heliconia*, and *Ravenala*, fig. 155, (Schreber's *Urania*, Gen. Pl. 212.) compose this Order, to which belongs *Strelitzia*, fig. 154, Ait. Hort. Kew. v. 2. 54.

Ord. 20. CANNÆ. "Calyx superior, coloured, divided into many, generally 6, petal-like segments, mostly unequal and irregular, the 3 outermost sometimes smallest, resembling an outer Calyx. Stamen 1, its filament inserted at the base of the Style, often flat and petal-like, with a linear adhering Anther, simple, or rarely double. Germen with a simple, often thread-shaped Style, and a simple or divided Stigma. Capsule of 3 cells, mostly with 3 valves, and many Seeds. Root often tuberous and creeping (perennial). Stem herbaceous, clothed with sheathing Footstalks. Leaves alternate, sheathing, convolute when young; either many-ribbed; or with a single mid-rib, sending off parallel ribs at each side. Flowers accompanied by Sheaths, generally disposed on a terminal or radical *Spadix*" (rather a Common Flower-stalk).

Jussieu's Genera are his own *Catimbium*, (which is *Renealmia* of Linn. Suppl. 7, but really belongs to *Alpinia*,) *Canna*, *Globba*, fig. 1, *Myrosma*, *Amomum*, *Costus*, *Alpinia*, *Maranta*, *Thalia*, *Curcuma*, *Kæmpferia*, and *Hedychium*, append. 448.

Mr. Roscoe, Tr. of Linn. Soc. v. 8. 330, has first correctly defined the genera of this Order, by the shape of the Stamen, or Filament, which affords excellent essential characters, concurring with other differences in habit and inflorescence, and all together establishing the most natural genera possible.

The Order is well divided by him and Mr. Brown, Prodr. N. Holl. v. 1. 307, into real CANNEÆ, comprising *Canna*, *Maranta**, *Thalia*, *Phrynium*, with (certainly) *Myrosma*; and SCITAMINEÆ, as Linnæus terms the whole, embracing all the rest. The *Canneæ* have a simple Anther, and are scarcely fragrant in any part; their Style is petal-like, or tumid, with a nearly simple, naked Stigma. The *Scitamineæ*, fig. 1, have an Anther of two distant lobes, meeting around their thread-shaped Style, whose Stigma is dilated, cup-shaped, and fringed. The plants are in some part or other, if not all over, powerfully aromatic or pungent. The character of this last Order may, according to our judgment, be thus more correctly given.

Calyx, fig. 1, a, superior, tubular, undivided, or unequally 3-lobed. Corolla, b, more or less tubular

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* Dr. Meyer, *Fl. Essequeb.* 6, has separated *M. Casupo*, Jacq. Fragm. 51. t. 68. f. 4, as a genus, by the name of *Calathea*.

at the base: Limb double; outer, c, c, c, in 3 deep segments, sometimes ringent; inner of two equal segments, d, d, occasionally abortive, as in *Amomum* and *Alpinia*, and a third larger, different in shape and colour, constituting an ornamental Lip, e, often lobed. Stamen 1, inserted into the tube of the Corolla opposite to the lip, its Filament, f, more or less dilated and petal-like, often lobed and elongated beyond the Anther, g, which consists of 2 lateral, parallel, distant, oblong lobes, clasping the Style, h. Mr. Brown has found 2 glandular bodies, rarely deficient, at the base of the Style, which he considers as rudiments of Stamens, making up, with the perfect one, the number 3, and confirming his theory (93). Germen, i, of 3, more or less complete, cells; Style, h, thread-shaped; Stigma, k, dilated, hollow, fringed. Capsule of 3 cells and 3 valves, in some instances pulpy, with many roundish, sometimes tunicated, Seeds. Albumen farinaceous. Embryo in the centre of the Albumen, somewhat turbinate, sheathing the simple *Plumula* (62 : 1) which arises from its base.

Gærtner and Brown consider the tubular part of the Embryo, in these plants, as a peculiar organ, termed *Vitellus* (62 : 3), whose office is conceived by the former to be the nourishment of the Embryo, though the Albumen is acknowledged to serve no other purpose. The part in question seems to me nearly analogous in form to the undisputed peltate Embryo of *Musa*, Gærtn. t. 11, in whose centre the point of the *Plumula*, in like manner, appears, nor is that of some of the Palms very different from the last.

The known genera of these true *Scitamineæ* are *Hedychium*, *Alpinia*, *Hellenia* of Willdenow and Brown, *Zingiber*, *Costus*, *Kæmpferia*, *Roscoea* Sm. Exot. Bot. t. 108, *Amomum*, *Curcuma*, *Globba*; fig. 1. and *Elettaria* Maton Tr. of Linn. Soc. v. 10. 254. These are hardly found without the tropics.

The puzzling genus *Philydrum*, Curt. Mag. t. 783, once referred to the *Scitamineæ*, is better placed by Mr. Brown in the *Junci*, with *Burmannia*.

Ord. 21. ORCHIDEÆ, fig. 70-72. " Calyx superior, often coloured, in 6 deep segments, 5 of which are superior, the 6th inferior, Nectary of Linnæus, mostly larger and dissimilar. Style 1, ascending, often connected with the upper lip at its base, sometimes very short, or scarcely any. Stigma dilated, not entirely terminal, but clapped as it were to the front of the Style. Anther 1, proceeding from the top of the Style under the Stigma, of two separate cells, often remote from each other; sometimes sessile and closely adhering to the two sides of the Style, sometimes supported by their own short filaments; each of 2 valves, and containing a glutinous mass of Pollen. Capsule of one cell, with 3 keeled angles, and 3 valves, bursting between the usually permanent keels. Seeds numerous, in general chaffy, inserted into receptacles attached to the middle of each valve. Root fibrous, usually with 2 knobs, each of which is either undivided or lobed. Stem frequently little more than a *Scapus*, rarely climbing. Leaves alternate, entire; the radical ones sheathing and ribbed; those of the Stem sessile, and scale-like. Flowers with sheath-like Bracteas, terminal, mostly spiked, rarely solitary."

Jussieu's genera, chiefly Linnæan, are *Orchis*, *Satyrium*, *Ophrys*, fig. 70, *Serapias*, *Limodorum*, *Thelymitra* Forst., *Disa*, *Cypripedium*, *Bipinnula* Commerson, *Arethusa*, *Pogonia* Juss., *Epidendrum*, and *Vanilla*.

Dr. Swartz and Mr. Brown have greatly improved the history of this Order, and augmented its genera, of which New Holland affords many new ones. From the remarks of these writers I would reform Jussieu's description, but without adopting their ideas of the integuments of the Flower, which I understand as follows.

Calyx superior, of 3 leaves, fig. 70, a, a, a, either spreading or converging; the solitary upper one often vaulted, rarely spurred at the base; the 2 lateral ones equal, sometimes combined at the bottom. Petals 2, b, b, ascending between the lateral and the uppermost calyx-leaves, and less than either, sometimes converging. Nectary, c, a lip, undivided or lobed, projecting, or dependent, between the 2 lateral calyx-leaves in front, often with one concave spur, rarely 2, from its base behind, in which, or occasionally in a chink on the, sometimes crested, disk of the lip, the honey is lodged; " the lip now and then bears a stalked appendage, whose stalk is occasionally irritable at it's joint." *Brown.* The Stamens, according to this able observer, consist of 3 Filaments, combined together, as well as more or less united to the Style, within the upper Calyx-leaf, opposite to the Lip; the 2 lateral ones almost always abortive, and generally short, or obsolete, the intermediate one only bearing an Anther. In *Cypripedium* alone, as far as hitherto observed, the latter only is abortive, both the side ones being antheriferous. Anther of 2 cells, which are either separate, and fixed to the sides of the Column (or Style), often extending beyond them; or brought together into a simple Anther, either parallel to the Stigma, immoveable and permanent, fig. 71, e, or terminating the Column in the form of a, generally moveable, deciduous lid, fig. 77 and 78, a; each cell being divided internally by one, seldom three, longitudinal partitions. The Pollen consists either of simple grains, or frequently of fourfold globules, collected into masses fitting the cells; these in the fixed divided Anther fig. 71, e, rarely in the terminal moveable one, fig. 77, 78, a, consist of many angular portions, cohering by elastic gluten; in the parallel Anther, rarely in the terminal one, the masses are rather powdery, in plates, of easily separable granulations; in the terminal lid fig. 78, a, they are usually waxy, homogeneous and smooth: after the cells open, the masses of Pollen, fig. 71, d and fig. 72, stick by a taper base, or elastic thread, to the Stigma, or any thing else. Germen, fig. 78, d, roundish, obovate, or oblong, with 3 principal ribs, or angles, each opposite to a Calyx-leaf; Style, fig. 78, b, united, more or less, with the Stamen, sometimes very short; Stigma fig. 78, c, c, oblique, facing the Lip, concave, moist, accompanied at the summit or sides with one or two glands, fig. 72, g, either naked, or in a membranous pouch or pouches, serving to attach the discharged Pollen. Capsule shaped like the Germen, of three valves, splitting for the most part at their sides only, between the ribs. Seeds very numerous and minute, mostly tunicated with a loose membrane; which is wanting in *Vanilla*, where they are imbedded in pulp. "Albumen the shape of the Seed." *Gærtn.* Embryo minute, simple, central, near the Scar.—"The Flowers of the *Orchideæ* have their lower part, or Lip, naturally placed inwards, but by a twist in their Stalk, or base of the Germen, they are mostly turned half round." *Brown.*

They all, as far as hitherto known, belong properly to *Gynandria Monandria* of Linnæus, *Cypripedium* only being referable to *Gynandria Diandria.* They are well distributed into sections, by the three different forms of the Anther, as above described; the texture of the Pollen being used by Mr. Brown for further distinctions. The Genera are distinguished according to these improved principles, in *Sm. Compend. Fl. Brit.* ed. 2 and 3, and by *Brown in Ait. Hort. Kew.* ed. 2, where they are greatly increased in number.

Ord. 22. HYDROCHARIDES. " Calyx of 1 leaf, superior, either entire or divided, the segments in a simple or double row, the inner ones (Corolla *Linn.*) petal-like. Stamens definite or indefinite, inserted upon the Pistil," (that is above the germen). "Germen simple. Style either simple, or definitely multiplied, or wanting. Stigma simple or divided. Fruit of one or many cells. Plants herbaceous and aquatic."

Jussieu's genera are *Valisneria*, *Stratiotes*, *Hydrocharis*, fig. 156, *Nymphæa*, *Nelumbium*, *Trapa*, *Proserpinaca* and *Pistia*. The author confesses his dissatisfaction respecting the last five genera, and not without reason. Mr. Salisbury, in Sims and Konig's Annals of Bot. v. 2. 69, first I believe showed *Nymphæa* and it's allies, amongst which are my *Nuphar* and *Cyamus*, (the latter Jussieu's *Nelumbium*,) to be dicotyledonous, and therefore they can have no place here; see Ord. 62. *Trapa* is well explained by Gærtner, as having two, though very unequal, Cotyledons. *Proserpinaca* has two very distinct equal ones.

CLASS 5. DICOTYLEDONES, WITHOUT PETALS, AND WITH EPIGYNOUS STAMENS (97).

"*Calyx superior, of one leaf. Corolla none. Stamens definite. Styles either wanting, or single, or definitely numerous.*"

Ord. 23. ARISTOLOCHIÆ. The only Order. "Stigma divided. Fruit of many cells, with numerous Seeds."

Aristolochia, *Asarum*, fig. 157, and *Cytinus*.

Mr. Brown considers this Order as monocotyledonous, and akin to *Tacca*; see *Ord.* 17.

CLASS 6. DICOTYLEDONES, WITHOUT PETALS, STAMENS PERIGYNOUS (97).

"*Calyx of* 1 *leaf, superior or inferior, entire or divided. Corolla none, except occasional scales, resembling petals, inserted into the upper part of the Calyx. Stamens inserted into the Calyx, definite or indefinite. Filaments as well as Anthers distinct. Germen, Style, and Stigma simple, rarely definitely multiplied. Seed either naked and superior; or Pericarp superior or inferior, mostly with one Seed, rarely many. Situation of the Embryo various. Flowers in some instances separated.*"

ORD. 24. ELÆAGNI. "Calyx tubular, superior. Stamens definite, inserted into the top of the tube. Style 1. Stigma generally simple. Fruit mostly pulpy, with 1 Seed, destitute of Albumen. Stem shrubby or arboreous. Leaves mostly alternate. Flowers sometimes separated."

Sect. 1. *Thesium*, fig. 158, *Hippophäe*, and *Elæagnus*, are examples with 5 Stamens or fewer.

Sect. 2. *Bucida* and *Terminalia* have usually 10. These last belong to Mr. Brown's *Combretaceæ*, see Ord. 88.

This is one of Jussieu's least solid Orders, and has been divided subsequently by himself. Out of it, with some of the *Onagræ*, Ord. 88, Mr. Brown has formed his *Santalaceæ*, Prodr. Nov. Holl. v. 1. 350, to the Seed of which he attributes a fleshy Albumen. Their Calyx is superior, partly coloured, it's Aestivation valvular (60); Stamens opposite to it's segments. Germen of 1 cell, with 2 to 4 rudiments of Seeds, pendulous from the upper part of a central Receptacle, 1 of them only coming to perfection. To this belong *Thesium*, *Santalum*, and some new genera, as also perhaps *Osyris* and *Olax*. *Elæagnus* has really, according to Mr. Brown, an inferior Calyx, the lower part of the tube being unconnected with the Germen, though enfolding it so closely as to have deceived most botanists. Gærtner found the same in *Hippophäe*, and these 2 genera make a small family by themselves.

Ord. 25. THYMELÆÆ. "Calyx inferior," (coloured at least internally). "Corolla none, but in some there are 4, 8 or 10 fleshy scales, in the throat of the Calyx. Stamens definite, inserted into the tube, and generally twice as many as the segments of the limb, in 2 series. Germen, Style, and generally Stigma, simple. Seed 1, naked, or pulpy, or invested with the Calyx. Albumen none. Radicle superior. Stem shrubby. Leaves mostly alternate."

A most natural Order, consisting of *Daphne*, fig. 13, *Passerina*, *Struthiola*, *Dais*, *Gnidia*, &c., to which is added the extensive New Holland diandrous genus *Pimelæa*, remarkable for its long Stamens.

Mr. Brown remarks, that the Aestivation (60) is imbricated, and that there is sometimes a thin fleshy Albumen. This is therefore one of the instances in which the absence or presence of that substance affords no absolute distinction, scarcely any Order being more natural than the present. The splendid silky tenacious fibres, of the bark when broken, mark the *Thymelaeæ.* A burning acrimony pervades the whole of the plants. The Flowers are generally fragrant. Leaves simple, undivided, and entire.

Ord. 26. PROTEÆ. "Calyx in 4 or 5 very deep segments, or tubular, with more shallow ones, it's base occasionally subtended by minute hairs or scales; segments each bearing 1 Stamen about the middle. Germen 1, superior. Style simple, as is usually the Stigma. Seed 1, either naked, or in a Pericarp, or the latter is a Capsule with several Seeds. Albumen none. Radicle inferior. Stem shrubby. Leaves alternate, or crowded into imperfect whorls. Flowers either distinct, or variously aggregate in an imbricated common Calyx, with a common Receptacle. Stamens and Pistil sometimes separated."

Protea, fig. 159, *Banksia, Roupala,* of Aublet, *Brabeium,* and *Embothrium,* fig. 160, are all the Jussieuan genera. But this Order, of which Linnæus had conceived no idea, has risen to great importance in the hands of Mr. Brown, Tr. of Linn. Soc. v. 10. and Prodr. Nov. Holl. v. 1. 363, under the name of *Proteaceæ.* Several of it's new genera indeed were first defined by the writer of this, in Tr. of Linn. Soc. v. 4; but New Holland afforded so many new ones, and those of southern Africa were so ill understood, that the subject required entire revision. The Aestivation of the Flower in this Order is valvular. What Jussieu and Brown term Calyx, I rather, with Dryander in Ait. Hort. Kew. and Linnæus, take for a Corolla. The Stigma is different in different genera, as well as the Pericarp, and the composition of the Flower, which calls up the puzzling question respecting Inflorescence (48) and Aggregate Flowers (69). The presence of a Common scaly or cellular Receptacle (63) in some *Proteaceæ*, I think, proves the latter; while in others the Flowers are certainly distinct, usually racemose. This difference is not at all incompatible with the integrity of the Natural Order, nor is the same terminology necessarily to be applied to both. The genera, 38 in Mr. Brown's essay above cited, I presume to think rather too much multiplied. They are principally arranged by the Fruit, which in some is closed (not bursting), the Anthers being either distinct or connected; in others bursting, bivalve, of 1 or 2 cells, whose partition is moveable.

There is not the most remote affinity between this Order and the preceding. The *Proteaceæ* have scarcely any flavour or scent in any part. Their fibres are coarse and rigid. Leaves various, entire or toothed, simple or repeatedly subdivided.

Ord. 27. Lauri. "Calyx in 6 divisions, permanent, bearing 6 Stamens from the base of it's segments, in some instances accompanied by an inner row of the same number. Anthers adhering to each filament, and bursting from the base upwards. Germen superior. Style 1. Drupa or Berry of 1 cell, with 1 seed. Albumen none. Stem arboreous or shrubby. Leaves generally alternate."

Laurus, fig. 161, is the type of this Order, to which Mr. Brown adds *Tetranthera* of Jacquin, and *Cassytha* Linn., with some new genera. *Myristica* and *Hernandia* are considered as bordering upon it.

There is always something peculiar in the structure of the Stamens in *Lauri*; they are remarkably compound, as it were, or aggregate, in a manner scarcely observable elsewhere.

Ord. 28. Polygoneæ. "Calyx of 1 leaf, divided, (coloured,) bearing the Stamens from it's base. Germen simple, superior. Stigmas several, often sessile. Seed 1, naked, or enveloped in the permanent Calyx. Embryo immersed in a farinaceous Albumen. Leaves alternate, each inserted into an annular, or sheathing, intrafoliaceous Stipula, or sheathing Footstalk; young ones revolute. Stem generally herbaceous."

Polygonum, fig. 162, *Rumex*, *Rheum*, are the chief genera.

In the first the Stamens can hardly be called, with Jussieu, definite. They are 5, 6, 8, or 9, bearing no analogy to the Calyx, which is 5-cleft. Styles or

Stigmas 2 or 3, sometimes separated from the Stamens. Mr. Brown observes the farinaceous Albumen to be sometimes deficient, that substance being fleshy and in very small quantity, in *Eriogonum* of Michaux; Pursh N. Amer. 277; a genus which cannot be removed from this very natural Order.

Ord. 29. ATRIPLICES. "Calyx of 1 leaf, deeply divided, bearing the definite Stamens from it's base. Germen 1, superior. Style 1, or wanting, or many, each with 1, rarely 2, Stigmas. Seed 1, many in *Phytolacca*, 2 in *Galenia*, either naked, or enveloped in the Calyx, or inclosed in a pulpy or capsular Pericarp. Embryo curved round the farinaceous Albumen. Stem herbaceous, in some shrubby. Flowers sometimes separated. Leaves mostly alternate, undivided, entire, more or less fleshy, without Stipulas."

A very natural and numerous Order, especially where the Seed is invested with the Calyx, as in *Basella*, *Salsola*, *Spinachia*, *Chenopodium*, *Atriplex*, fig. 163, *Blitum*, *Salicornia*. In the two latter the Stamens, being occasionally 1, 2, or 3, and bearing no fixed analogy to the Calyx, are scarcely to be called definite. Mr. Brown denominates this Order *Chenopodeæ*, with DeCandolle, and remarks that it has no character to distinguish it from the *Amaranthi*, Ord. 30, though there is a difference in habit. In fact, the insertion of the Stamens is not, in either tribe, so fixed, as to be depended on, though the distinction between Jussieu's 6th and 7th Classes depends hereon.

CLASS 7. DICOTYLEDONES, WITHOUT PETALS*. STAMENS HYPOGYNOUS (97).

" *Calyx inferior, of* 1 *or many leaves. Corolla scarcely any, though some have petal-like scales, or bristles, bearing the Stamens, or alternate with them, and others even a tube, either bearing the Stamens or not. Stamens definite, usually distinct, and, properly, inserted beneath the simple Germen, without any attachment to the Calyx, but this is not constant. Style* 1, *or many, or wanting. Stigma* 1, *or several. Seed* 1, *or Capsule of* 1 *or* 2 *cells, with* 1 *or many Seeds.*"

Ord. 30. AMARANTHI. " Calyx deeply 5-cleft, often surrounded by scales. Stamens sometimes combined, occasionally having intermediate scales, or a common tubular base. Styles or Stigmas 1, 2, or 3. Capsule of 1 cell, with an unconnected Receptacle, and either bursting at the top, or all round. Seed 1 or many. Embryo rolled about a farinaceous Albumen. Flowers capitate, or spiked; sometimes separated. Leaves usually undivided and pointed; sometimes with Stipulas. Stem in the greater part herbaceous."

Amaranthus, *Celosia*, *Achyranthes*, fig. 164, *Gom-*

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[*] Except Ord. 31, 32, and 33.

phrena, are genuine examples, and Mr. Brown has several new ones. He separates those with Stipulas into an Order termed *Illecebreæ*, of which *Paronychia* of Tournefort, and *Herniaria*, are specimens.

Ord. 31. PLANTAGINES. "Calyx generally deeply four-cleft, with a thin narrow-mouthed tube, like a Corolla, but fading, not deciduous, often splitting. Stamens 4, long, prominent, connected with the bottom of the tube. Germen, Style, and Stigma simple. Capsule bursting circularly, of 1 or 2 cells, with 1 or more Seeds in each, destitute of Albumen. Herbs, with sometimes separated Flowers."

Psyllium of Tournefort, with *Plantago*, fig. 166, and *Littorella*, are all the genera. The two former are united by Linnæus, DeCandolle and Brown; the last is monoecious. Much doubt attends this singular and unconnected Order. Mr. Brown, like Linnæus, gives the evident Corolla its proper appellation, there being a distinct Perianth, in 4 deep segments, besides.

Ord. 32. NYCTAGINES. "Calyx tubular, like a Corolla, either naked, or surrounded by an outer Calyx. Germen, Style and Stigma simple. Stamens definite, inserted into a glandular ring, proceeding from the Receptacle, round the base of the Germen. Seed 1, covered by the ring, as well as by the base of the tube, both permanent. Embryo surrounding a farinaceous Albumen. Stem shrubby or herbaceous. Leaves opposite or alternate, simple and undivided. Flowers axillary and terminal."

Mirabilis, fig. 167, (*Nyctago* Juss.) *Boerhaavia*, and *Pisonia*, with *Abronia* of Jussieu (*Tricratus* L'Herit.) and *Buganvillæa* of Commerson, compose this Order, to which *Oxybaphus* of L'Heritier, Curt. Mag. t. 434, must be added.

The Calyx of Jussieu is the evident Corolla of other botanists, nor do we perceive what is gained by his paradoxical appellation. Still less does the apetalous character of his 7th Class suit the following Order.

Ord. 33. PLUMBAGINES. "Calyx tubular. Corolla of 1 or many Petals, beneath the Germen. Stamens definite, inserted either beneath the Germen, or into the Corolla. Germen solitary, superior. Style 1 or many. Stigmas many. Capsule separating into several valves at the base only. Seed solitary, pendulous from a thread-shaped stalk, originating from the Receptacle of the Germen. Embryo oblong, flat, surrounded by a farinaceous Albumen. Stem herbaceous, or somewhat shrubby. Leaves alternate," (undivided).

Plumbago and *Statice*, fig. 168, (the latter subdivided by Brown) are the only genera.

This Order and the 31st are arranged by Mr. Brown amongst his *Monopetalæ*.

We cannot but remark a great inaccuracy in this part of the Jussieuan System, as to technical characters respecting Calyx and Corolla; but without any reflection upon it's illustrious author. Such are incidental to every attempt of the kind, nor can art keep pace with nature. It seems proper nevertheless that these three last Orders should be removed to some of the following Classes.

CLASS 8. DICOTYLEDONES. COROLLA MONOPETALOUS, HYPOGYNOUS.

" *Calyx of one leaf. Corolla regular or irregular, bearing the Stamens, which are definite, and generally alternate with its segments when of equal number. Germen superior, in general simple, with one Style; but in some Apocinei, Ord. 47, the Germen is double, without any Style. Stigma simple or divided. Seeds either naked, or more frequently in a Pericarp, either pulpy or capsular, of 1 or many cells.*"

A great and important Class; whose 15 Orders follow one another in a tolerably natural series. Some are generally furnished with Albumen, others not; but this difference bears no analogy to the other characters of affinity, or of distinction, between the Orders.

Ord. 34. LYSIMACHIÆ. " Calyx divided. Corolla mostly regular, five-cleft, bearing as many Stamens opposite to the lobes. Style 1. Stigma rarely cloven. Fruit of 1 cell, with many Seeds, often capsular, with a central unconnected Receptacle. Stem herbaceous. Leaves opposite, or alternate."

Some have a Stem, as *Anagallis*, fig. 169, *Lysimachia*, *Hottonia*; *Limosella*, &c.; others radical

Flower-stalks, mostly umbellate, as *Androsace*, *Primula*, *Dodecatheon*, *Cyclamen*; and there is an appendix of nearly allied genera, comprising the very doubtful *Globularia*, with *Conobea* of Aublet, *Tozzia*, *Samolus*, *Utricularia*, fig. 170, *Pinguicula* and *Menyanthes*, fig. 184.

Mr. Brown, following Ventenat, calls this Order *Primulaceæ*, and has separated from it some of the appendix, by the name of *Lentibulariæ*, given by Richard. Their Corolla is irregular, with a spur. Stamens 2. Albumen none. Embryo sometimes undivided—that is, to speak plainly, *monocotyledonous*!

Ord. 35. PEDICULARES. "Calyx divided, permanent, often tubular. Corolla usually irregular. Stamens definite. Style 1. Stigma rarely cloven. Capsule of 2 cells and 2 valves, each having a central partition, bearing the numerous Seeds. Stem generally herbaceous. Leaves, as well as Flowers, opposite or alternate, with 1 Bractea to each Flower."

Erinus, *Castilleia*, *Euphrasia*, *Bartsia*, fig. 171, *Pedicularis*, *Rhinanthus*, *Melampyrum*, are genuine examples of this Order, all turning more or less black in drying, and well distinguished by their Anthers and Seeds. Their Stamens are 4, 2 longer than the rest. *Hyobanche*, *Orobanche*, *Lathræa*, &c., are less strictly akin to these; and *Polygala*, with *Veronica*, fig. 2, and *Sibthorpia*, fig. 176, are but slightly related to them or to each other.

Ord. 36. ACANTHI. "Calyx divided, permanent, often bracteated. Corolla generally irregular. Stamens 2; or 4, 2 of which are longer. Style 1. Stigma 2-lobed, rarely simple. Capsule of 2 strong elastic valves, with central partitions, bearing the few and large Seeds. Stem herbaceous or shrubby. Leaves, as well as Flowers, mostly opposite."

Acanthus, *Barleria*, *Ruellia*, *Justicia*, fig. 172, with some others, constitute this very natural Order, which Mr. Brown has deeply studied, and happily illustrated, *Prodr. Nov. Holl.* v. 1. 472. He notices the various, equal or unequal, simple or double, forms of the Anthers, and the awlshaped support of each Seed, which is very peculiar, though not invariably present. The Seeds have no Albumen. There is often a rudiment of a fifth Stamen.

Ord. 37. JASMINEÆ. "Calyx tubular. Corolla regular, tubular, rarely deeply four-cleft, occasionally wanting. Stamens 2. Style 1. Stigma 2-lobed. Fruit either capsular, somewhat like the *Acanthi*; or pulpy, with 1 or 2 cells. Seeds few. Embryo straight and flat, mostly surrounded by a fleshy Albumen. Stem shrubby, or arborescent, with opposite branches and Leaves. Flowers oppositely panicled, or corymbose."

Syringa (*Lilac* Juss.) and *Fraxinus*, with *Chionanthus*, *Olea*, fig. 173, *Jasminum* and *Ligustrum* are examples of this Order, which abounds with elegant Shrubs, whose fragrant Flowers are highly valued. Its relationship to the last is extremely slight, and scarcely discernible in any one point, except the valves and fixed partitions of the Capsule in *Syringa*, obscurely resembling *Justicia* &c., but not, like them, elastic, nor is there any resemblance in the number, form or disposition, of the Seeds or their supports.

Mr. Brown separates the true *Jasmineæ*, whose Seeds are erect, with hardly any Albumen, and their Corolla salver-shaped, in from 5 to 8 segments, with an imbricated twisted Aestivation; from the *Oleinæ* of Hoffmansegg and Link, whose Seeds are pendulous, with a copious, dense, fleshy Albumen, and a deeply four-cleft Corolla, sometimes wanting.

Ord. 38. VITICES. "Calyx tubular, often permanent. Corolla tubular, for the most part irregular in the limb. Stamens generally 4, didynamous, rarely 2, or 6. Style 1. Stigma variously shaped. Seeds definite, either naked, or more frequently in a pulpy, sometimes capsular, pericarp. Stem shrubby (or arboreous), in a few herbaceous. Leaves opposite for the most part; as are the Flowers when corymbose; but when spiked they are alternate." These different forms of inflorescence mark the 2 Sections.

In the 1st, are *Clerodendrum*, *Vitex*, *Callicarpa*, *Cornutia*, *Tectona* (*Theka* Juss.) &c.; in the 2d, *Petræa*, *Citharexylum*, *Duranta*, *Verbena*, fig. 174, and others. *Eranthemum*, *Selago*, and *Hebenstretia* stand as "akin to *Vitices*."

Jussieu has changed the name of this Order to

Verbenaceæ, in Annal. du Mus. v. 7. Br. Prodr. v. 1. 510.

Ord. 39. LABIATÆ. "Calyx tubular, either 2-lipped, or rather unequally 5-cleft. Corolla tubular, irregular, mostly 2-lipped. Stamens 4, didynamous, inserted under the upper lip; 2 of them sometimes imperfect, or wanting. Germen 4-lobed. Style 1, central, from the base of the lobes. Stigma cloven. Seeds 4, naked, erect, inserted by their base into a Receptacle at the bottom of the permanent Calyx. Albumen none. Stem quadrangular, oppositely branched, mostly herbaceous. Leaves opposite, scarcely ever compound. Flowers opposite, with leafy or bristly Bracteas; solitary, or whorled; corymbose, or spiked; terminal, or axillary."

A most natural Order, the *Verticillatæ* of Ray and Linnæus. Herbage usually aromatic, often bitter, always harmless.

Jussieu makes 4 Sections.

Sect. 1. Two Stamens only perfect. *Lycopus, Monarda, Rosmarinus, Salvia*, &c.

Sect. 2. Four perfect Stamens. Upper lip scarcely any. *Ajuga* (*Bugula* Juss.) and *Teucrium*.

Sect. 3. Stam. 4. Cor. 2-lipped. Calyx 5-cleft. *Satureia, Nepeta, Lavandula, Mentha, Lamium*, fig. 21, 22, *Stachys, Marrubium, Phlomis*, &c.

Sect. 4. Stam. 4. Cor. 2-lipped. Calyx 2-lipped. *Origanum, Thymus, Dracocephalum, Melittis, Prunella, Scutellaria*, &c.

Atropa, *Physalis*, *Solanum*, fig. 177, *Witheringia*, *Capsicum*, *Lycium*, *Cestrum*, &c.

The Flowers are rarely 4-cleft; often irregular, as occasionally in *Solanum*, which genus cannot safely be divided on that account. The Albumen is more correctly described, by Gærtner and Brown, as fleshy, inclosing the curved Embryo. This curvature, and the plaited Aestivation of the Corolla, which is not ringent, or 2-lipped, Mr. Brown reckons the most essential differences between this Order and the *Scrophulariæ*. *Bontia*, *Brunfelsia*, and *Crescentia* are subjoined as akin to *Solaneæ*. The genuine plants of this Order are narcotic, fœtid, often very dangerous, termed by Linnæus *Luridæ*, or Gloomy. *Verbascum* however, abounding with mucilage, is only mildly sedative, and perfectly safe for internal use, though intoxicating to fish.

Ord. 42. BORAGINEÆ. "Calyx 5-cleft, permanent. Corolla almost universally regular, and Stamens 5. Germen either simple or 4-lobed. Style 1. Stigma divided, or furrowed, or simple. Seeds mostly 4; sometimes in a capsular or pulpy pericarp; sometimes naked, attached obliquely to the base of the Style, and encompassed with the (often greatly enlarged) Calyx. Albumen none. Stem in most cases herbaceous; rarely shrubby or arboreous. Leaves alternate, often harsh." (Stipulas wanting.)

These, the *Asperifoliæ* of Ray and Linnæus, compose on the whole a very natural assemblage; of which *Heliotropium*, *Echium*, *Lithospermum*, fig. 178, *Pulmonaria*, *Onosma*, and perhaps *Coldenia*, all which have a naked-mouthed, or pervious, Corolla; with *Symphytum*, *Lycopsis*, *Myosotis*, *Anchusa*, *Borago*, *Asperugo*, *Cynoglossum*, and *Trichodesma* of Brown, whose tube is closed with valves, constitute indubitable examples. *Tournefortia*, *Ehretia*, and *Cordia*, (the latter comprehending *Varronia*,) are also retained here; but Mr. Brown proposes to separate *Hydrophyllum*, *Ellisia*, and Jussieu's *Phacelia*, as having a copious cartilaginous Albumen, compound, or at least deeply lobed, Leaves, and a capsular Fruit.

The true *Borragineæ* are allied by their Seeds to *Labiatæ*, Ord. 39; but differ in their pungent or warty, not hairy, pubescence; mucilaginous, not aromatic, qualities; alternate, not opposite, Leaves; and blue, rather than crimson or purple, Flowers, except in the bud. *Messerschmidia* and *Cerinthe* differ from the rest in having a kind of two-celled twin Capsule, or Nut; and *Cerinthe* has a glaucous, smoother, though warty, habit, with reddish or yellow Flowers. *Onosma* too is always yellow-flowered. The change in the Corolla of the *Borragineæ* in general, from bright red, to a vivid blue, as the Flower expands, apparently caused by the sudden loss of some acid principle, is a very curious phœnomenon.

Ord. 43. CONVOLVULI. "Calyx deeply 5-cleft, often permanent. Corolla regular, with a generally 5-lobed limb. Stamens as many as the segments, alternate with them, inserted into the lower part of the tube. Style 1, or definitely divided into several. In the latter case the Stigmas are simple; in the former the solitary Stigma is sometimes divided. Capsule of 3, rarely 2 or 4, cells, with 1 or many Seeds, which are rather bony, marked with a Scar, *Hilum*, in the lower part, and attached to the base of the central partition, whose angles meet, but are not connected with, the margins of the valves. Embryo curved, the radicle inferior. Plants shrubby, or often herbaceous, twining in several instances, sometimes milky. Leaves alternate, very seldom imperfectly opposite."

Mr. Brown notes the want of Stipulas, and the presence of a small mucilaginous Albumen, as well as the corrugated Cotyledons (always attendant on Seeds whose number is definite). He differs from Jussieu with regard to some genera, but the following are indubitable specimens of the Order.

Sect. 1. With 1 Style. *Convolvulus*, fig. 179, and *Ipomæa.*

Sect. 2. with several Styles. *Evolvulus* and *Cressa*, as well as *Breweria*, *Polymeria*, and probably *Wilsonia*, of Brown. *Dichondra* enters a Section with from 2 to 4 single-seeded Germens; and *Cuscuta* forms another, *destitute of Cotyledons*!

Ord. 44. POLEMONIA. "Calyx divided. Corolla regular, 5-lobed, with 5 Stamens inserted into the middle of its tube. Style 1, with 3 Stigmas. Capsule surrounded by the permanent Calyx, of 3 cells and 3 valves, with many Seeds, each valve bearing a central partition, meeting an angle of the triangular central column, or Receptacle of the Seeds. Stem herbaceous or shrubby. Leaves alternate or opposite. Flowers terminal or axillary."

Phlox and *Polemonium*, with Jussieu's *Cantua* and *Hoitzia*, make up this Order. The first is somewhat allied to the *Caryophylleæ*, Ord. 82, but, being monopetalous, cannot be referred thither. Indeed their affinity is but slight. Jussieu confounds with his *Cantua*, the very distinct *Ipomopsis* of Michaux, fig. 180; see Exot. Bot. t. 13, 14.

Ord. 45. BIGNONIÆ. "Calyx divided. Corolla mostly irregular, with 4 or 5 lobes. Stamens generally 5, one of them imperfect. Style 1. Stigma simple, or 2-lobed. Fruit of 2 cells; in some capsular, of 2 distinct valves, the partition, bearing the numerous Seeds, either opposite or parallel to the valves, and separable therefrom; in others coriaceous or woody, bursting at the top only, with few seeds, on a partition inseparable from the valves, which is often extended at each side into a ridge, or wing, partially subdividing the cells. Albumen none. Stem herbaceous, shrubby, or arboreous. Leaves mostly opposite."

Sect. 1. Capsule of 2 valves. Stem herbaceous. *Chelone*, *Sesamum*, and Jussieu's *Incarvillea*, Lamarck Illustr. t. 527. The latter is named after Father d'Incarville, to whom Jussieu attributes the importation of the *Aster chinensis* in 1743. But Sherard cultivated that plant before 1732.

Sect. 2. Capsule of 2 valves. Stem arboreous or shrubby. *Millingtonia*, *Jacaranda* Juss., *Catalpa*, *Tecoma* Juss. and *Bignonia*, fig. 181, with *Spathodea* of Palisot and Brown, and *Cobæa* of Cavanilles, Curt. Mag. t. 851, whose capsule has from 3 to 5 valves and cells, make up this Section, to which Mr. Brown confines his idea of *Bignoniaceæ*, Prodr. Nov. Holl. v. 1. 470; perhaps admitting also the above-mentioned *Incarvillea*.

Sect. 3. Fruit between coriaceous and woody, bursting at the top. Stem herbaceous. *Tourretia* (*Dombeya* L'Herit.), *Martynia*, *Craniolaria*, and *Pedalium*. We know not whether Mr. Brown admits all these, as well as Ventenat's *Josephinia*, Jard. de la Malmais. t. 67, into his *Pedalinæ*, Prodr. N. Holl. v. 1. 519.

Ord. 46. GENTIANÆ. "Calyx of 1 leaf, divided, permanent. Corolla regular, often withering, it's limb in as many equal, sometimes oblique, lobes, as there are segments in the Calyx, usually 5. Stamens as many, inserted into the middle or top of the tube. Anthers incumbent (sometimes combined). Style 1, rarely splitting into 2. Stigma simple or lobed. Capsule simple or twin, many-seeded, of 2 valves, and 1 or 2 cells, the edges of the valves inflexed, forming the partition when there are 2 cells, rolled inward when there is only 1. Seeds minute, their Receptacle marginal. Stem herbaceous, rarely somewhat shrubby. Leaves opposite, mostly undivided and sessile; floral ones occasionally diminished into a pair of Bracteas."

A very natural Order, distinguished by it's general, often very intense, bitterness. Mr. Brown observes, that the segments of the Corolla are imbricated before expansion, and vary from 4 to 8; we may say to 12 or 13. The Fruit is sometimes pulpy. The Embryo is straight, in the axis of a soft fleshy Albumen; the Radicle pointing towards the Scar. Plants mostly smooth. Leaves undivided and entire, without Stipulas.

Sect. 1. Capsule of 1 cell. *Gentiana*, fig. 182, whose Corolla is very differently shaped in the different species, *Lita* Schreb. Gen. 795. (*Vohiria* Aubl.), *Picrium* Schreb. 791. (*Coutoubea* Aubl.), *Swertia* and *Chlora;* to which may be added *Sabbatia* of Adanson and Salisbury, Pursh N. Amer. 137, *Orthostemon* Br. and *Erythræa* of Renealm and Brown, Prodr. N. Holl. v. 1. 451, composed of several *Chironiæ* of other authors.

Sect. 2. Caps. simple, of 2 cells. *Exacum*, fig. 183, *Lisianthus*, *Myrmecia* Schreb. Gen. 74 (*Tachia* of Aubl.), *Chironia* and *Nigrina;* as well as *Sebæa* of Solander and Brown, with *Mitrasacme* Labill. a large New Holland genus.

Sect. 3. Caps. of 2 separable cells. *Spigelia* and *Ophiorrhiza*, excluding *O. Mungos* which is a distinct genus of the *Rubiaceæ*, Ord. 57. Here also is to be introduced Mr. Brown's *Logania* (*Euosma* Andr. Repos. t. 520), curious as a connecting link between this Order and the next.

Sect. 4. contains only *Nicandra* Schreb. Gen. 283, (*Potalia* Aubl.) as being akin to *Gentianæ.* So also Mr. Brown subjoins *Villarsia*, fig. 184, Ventenat Choix, t. 9, (extracted from the Linnæan *Menyanthes*,) and *Anopterus* of Labill. Nov. Holl. t. 112; plants differing from true *Gentianæ* in having mostly alternate, partly toothed, Leaves, and on the whole very ambiguous.

Ord. 47. APOCINEÆ. "Calyx 5-cleft. Corolla regular, with 5, often oblique, lobes, sometimes naked, sometimes accompanied by 5 internal, variously shaped, appendages. Stamens 5, inserted into the lower part of the Corolla, alternate with it's lobes; the filaments often short, either distinct, or more rarely united into a tube closely embracing the Germen. Anthers of 2 cells, the summit extended into a membrane, or thread. Germen single, or double, standing on a frequently glandular Receptacle. Styles 1 or 2, sometimes extremely short, attached, as it were by a joint, to the single or double Germen. Stigma one, capitate, obsolete. Fruit, in those with a single Germen, pulpy, or rarely a solitary Capsule, usually of 2 cells, with many Seeds; in those with 2 Germens, 2 combined, oblong, coriaceous Follicles (61 : 1), rarely shortened and slightly pulpy, bursting lengthwise at the inner edge, each of 1 cell. Seeds numerous, either naked or feathery, imbricated, in many rows, over one side of a lateral, unconnected, flat Receptacle, lying along the inside of the Follicle, near it's suture. Embryo flat, in a thin fleshy Albumen. Plants herbaceous, shrubby, or arboreous, generally milky. Leaves opposite or alternate, with fringed axillary glands, not always evident."

Sect. 1. Germens 2. Follicles 2. Seeds not feathery. *Vinca*, fig. 186, *Matelea* Aubl., *Ochrosia* Juss., *Tabernæmontana*, *Cameraria* and *Plumieria*.

Sect. 2. Germ. and Follic. 2. Seeds feathery. *Nerium*, *Echites*, *Ceropegia*, *Pergularia*, fig. 185, *Stapelia*, *Periploca*, *Apocynum*, *Cynanchum* and *Asclepias*.

Sect. 3. Germen simple. Fruit pulpy, rarely capsular. *Willughbeja* Schreb. Gen. 162, (comprising *Ambelania* and *Pacouria* of Aubl.) *Alamanda*, *Melodinus*, *Gynopogon*, *Rauwolfia*, *Ophioxylon*, *Cerbera* and *Carissa*.

Sect. 4. Genera akin to *Apocineæ*, not milky. *Strychnos*, including *Ignatia* of Linn., *Theophrasta*, *Anassa* Juss., *Fagræa* Thunb. and *Gelsemium* Juss.

This Order, very natural, except the last Section, is what Linnæus termed *Contortæ*, from the frequent obliquity, or flexure, of the Corolla. Mr. Brown has most happily divided it, see Tr. of the Wern. Soc. v. 1. 12, and Prodr. N. Holl. v. 1. 465, separating from the rest such as have the Pollen of each Anther coalescing into two distinct, stalked masses, like the

Orchideæ, Ord. 21, and deposited by the Anther upon 5 appropriate prominences of the pentagonal Stigma, which is common to the 2 Styles. These plants constitute a new Order, named *Asclepiadeæ*, of which *Ceropegia*, *Stapelia*, *Pergularia*, *Asclepias*, *Cynanchum* and *Periploca* are examples. Mr. Brown has 38 genera in all, the original *Stapelia* being greatly, perhaps too much, subdivided. Of the remaining *Apocineæ*, whose Pollen is granular and conveyed in the usual way to the Stigma, Mr. Brown has 15 genera with feathery Seeds, among which are *Echites*, *Apocynum* and *Nerium*. Of those whose Seeds, though sometimes winged with a membrane, are not feathery, such as *Vinca*, *Plumieria* and *Cameraria*, he has not yet published any particular illustration.

The leaves in both Orders are simple and entire. Inflorescence of *Asclepiadeæ* aggregate, lateral, between the Footstalks.

Ord. 48. SAPOTÆ. "Calyx divided, permanent. Corolla regular, it's segments either equal in number to those of the Calyx, with alternate interior appendages; or twice as many, without such appendages. Stamens opposite to the segments of the Corolla, and agreeing with them in number; or else twice as many, the appendages bearing Anthers. Germen, Style, and generally Stigma, simple. Fruit a berry, or drupa, of one or many single-seeded cells. Seeds bony, polished, with a lateral scar. Embryo flat, encompassed with a fleshy Albumen. Stem woody. Leaves alternate, mostly undivided and entire. Flowers axillary, many together on single-flowered stalks. Plants milky."

Jacquinia, *Sideroxylum*, *Bassia*, fig. 187, *Mimusops* (including *Imbricaria* of Jussieu, which is perhaps *M. Kauki* Linn.), *Chrysophyllum* and *Achras*, with one or two others, less certain, make up this Order. *Myrsine*, fig. 188, (to which I have long ago referred Jussieu's *Manglilla*, *Bumelia Manglilla* Willd. Sp. Pl. v. 1. 1087.) enters a new Order, *Myrsineæ* of Brown, Prodr. N. Holl. v. 1. 532, with *Aegiceras* of Gærtner, and of Konig, Ann. of Bot. v. 1. 129. t. 3, and I presume *Inocarpus* Forst. *Olax* is judged by Mr. Brown as rather akin to his *Santalaceæ*, see Ord. 24; and *Leea*, the same genus with *Aquilicia*, is undoubtedly one of the *Meliæ*, Ord. 71.

CLASS 9. DICOTYLEDONES, COROLLA MONOPETALOUS, PERIGYNOUS.

" *Calyx of one leaf, sometimes deeply divided, bearing the Corolla, which is monopetalous, though occasionally so deeply divided as to become polypetalous* *; *regular, rarely irregular. Stamens inserted either into the Corolla or Calyx, definite, seldom indefinite. Germen simple, superior or inferior. Style generally single. Stigma rarely divided. Fruit pulpy or capsular, of one or many cells.*"

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* Even in one and the same species, as *Andromeda calyculata*.

The insertion of the Corolla, characteristic of this Class, is not very apparent, and I observe that Mr. Brown does not allude to such insertion, but, even in the character of the *Ebenaceæ,* contradicts it. In fact, nature and art accord very ill in this part of the System. The first Order might, in the main, be removed to the foregoing Class, with whose character it agrees: while the fourth goes most readily and naturally to the eleventh Class, having some relationship to the tenth. But the great difficulty consists in the second and third Orders of this ninth Class, in which there is really no such insertion of the Corolla as above mentioned *; and the inferior Germen of *Vaccinium* is an insurmountable stumbling-block. Nothing could justify, in a professedly natural system, the removing this last genus from the neighbourhood of *Erica* and *Azalea;* and it were better to have met the difficulty by an open avowal, with some contrivance of an artificial nature, making *Vaccinium* an exception. The true *Rhododendra* and *Ericæ* would go very well into the eighth Class. It must be observed that their Stamens are often hypogynous, really inserted into the Receptacle under the Germen.

Ord. 49. GUAIACANÆ. "Calyx of one leaf, divided in the upper part. Corolla lobed, or deeply divided. Stamens inserted therein; sometimes definite, as many, or twice as many, as its segments; sometimes indefinite, monadelphous or polyadelphous at the base. Germen mostly superior, in a few inferior, or half-inferior. Style 1. Stigma simple or divided. Fruit capsular, or more frequently pulpy, of many single-seeded cells. Embryo flat, in a fleshy Albumen. Stem shrubby or arboreous. Leaves alternate. Flowers axillary."

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* Mr. Salisbury has long ago anticipated this remark. *Tr. of Linn. Soc.* v. 8. 12.

Sect. 1. Stamens definite. *Diospyros*, fig. 189, *Royena*, *Labatia*, Schreb. Gen. 790 (*Pouteria* Aubl.), *Styrax* and *Halesia*.

This Section constitutes an Order subsequently established by Jussieu, under the name of EBENACEÆ, and adopted by Mr. Brown, Prodr. N. Holl. v. 1. 524. The latter considers *Diospyros*, *Royena*, *Embryopteris* Gærtn., *Paralea* Aubl., *Maba* Forst. (*Ferreola* Koen. and Roxb.), and his own *Cargilla*, Prodr. 526, as perhaps the only certain genera of this new Order; whose Corolla is really hypogynous, leathery, generally downy on the outside. Flowers more or less separated. Anthers lanceolate, attached by the base, bursting lengthwise. Berry with few perfect Seeds.

Sect. 2. Stam. indefinite. *Alstonia*, *Symplocos*, *Ciponima* Aubl., *Paralea* Aubl., and *Hopea* Linn., all now considered as one genus under the oldest name *Symplocos*. *Styrax* and *Halesia* certainly answer best, even to the technical character of this Section, and perhaps ought to be placed here; unless more akin, as Jussieu hints of the former, to his *Melia*, Ord. 71.

Ord. 50. RHODODENDRA. "Calyx divided, permanent. Corolla attached to it's base" (scarcely so), "either monopetalous and lobed, or so deeply divided as to become almost polypetalous. Stamens definite, distinct, inserted into the Corolla if monopetalous" (very slightly, if at all); "if it be polypetalous, into the bottom of the calyx" (rather into the receptacle). Germen superior. Style 1. Stigma single, often capitate. Capsule superior, with many cells and many valves, whose inflexed edges constitute the partitions, uniting with the central column. Seeds numerous, minute. Stem shrubby. Leaves alternate, rarely opposite, mostly revolute when young.

Sect. 1. Corolla monopetalous. *Kalmia*, *Rhododendrum*, fig. 190, *Azalea*; to which is to be added *Menziesia*, Sm. Pl. Ic. t. 56. Comp. Fl. Brit. ed. 3. 61.

Sect. 2. Cor. nearly polypetalous. *Rhodora*, *Ledum*, *Bejaria* (erroneously printed by Linnæus *Befaria*), and *Itea*.

It is singular that the able author should have remarked in *Rhodora* only, what is the striking mark of his true *Rhododendra*, the bursting of the Anthers by 2 oval pores near the top, without any crest or appendage. *Itea* wants this character.

This Order appears to have scarcely any affinity, except perhaps in hardness of wood, to the preceding.

Mr. Salisbury has remarked a coloured glandular tip to the Leaves, as characteristic of the *Rhododendra.*

Ord. 51. ERICÆ. "Calyx of 1 leaf, permanent, sometimes superior, more frequently inferior, deeply divided. Corolla monopetalous, in some instances deeply divided, inserted into the bottom of the Calyx, or glands belonging to it," (Jussieu says also into the top,) "often withering and permanent. Stamens definite, distinct, inserted similarly, or rarely proceeding from the base of the Corolla. Anthers often with 2 horns at the base" (always I believe opening by 2 pores). "Germen superior, or rarely inferior. Style 1. Stigma generally single. Fruit of many cells, pulpy, or more frequently capsular, with many valves, the partitions" (not constantly) "from the middle of each, joining the central column. Seeds numerous, and generally minute. Stem mostly shrubby. Leaves alternate, opposite, or whorled."

Sect. 1. Germen superior. *Cyrilla* Linn. (not distinct in genus from *Itea,* see last Order), *Blæria, Erica,* fig. 191, *Andromeda, Arbutus, Clethra, Pyrola, Epigæa, Epacris,* fig. 8, 9, *Gaultheria,* and *Brossæa.*

Sect. 2. Germen inferior, or half-inferior. *Argophyllum* Forst., *Mæsa* Forsk., and *Vaccinium,* fig. 192. *Empetrum* and *Hudsonia* are subjoined as allied to *Ericæ.*

Mr. Brown has happily separated from hence *Epacris,* fig. 8, 9, and it's very numerous allies, which compose a beautiful and distinct Order, termed EPACRIDEÆ, Prodr. N. Holl. v. 1. 535. They occupy the same place at New Holland, that the vast genus *Erica* does at the Cape of Good Hope, and are distinguished by the simple structure of their Anthers, first noticed by Mr. Brown. Each Anther bursts longitudinally in front, opposite to it's dorsal point of insertion, and then becomes a single flat valve, the rather large Pollen being borne by a narrow receptacle, or partition, which originally divided the Anther into 2 cells. The Germen has usually 5 scales, sometimes a notched ring, at the base. Stigma capitate, sometimes notched or toothed. Fruit either a Drupa, Berry, or Capsule, rarely of only 1 cell. Stem shrubby, with rigid, alternate, mostly entire, Leaves, and elegant white or crimson, rarely blue, Flowers, variously disposed, often drooping.

Itea, including *Cyrilla*, has Anthers of 2 cells, bursting from top to bottom, at 2 opposite sides, so that, to say nothing of the great difference of habit, it cannot be brought hither.

The partitions of the Capsule are in some of the genus *Erica* formed from the inflexed edges of the valves, as in the *Rhododendra*, Ord. 50; in others proceeding from the centre of each valve. This difference exists in species otherwise so nearly akin, that no person has ventured to divide the genus by it, any more than by various appendages to the Anthers, which, however remarkable, afford no sound generic distinctions.

Ord. 52. CAMPANULACEÆ. "Calyx superior, it's limb deeply divided; rarely half-inferior. Corolla (inserted into the top of the Calyx *Juss.*) mostly regular, with a divided limb, generally withering. Stamens inserted into the same part under the Corolla, alternate with it's segments, and equal to them in number, generally 5, with distinct, occasionally combined, Anthers. Germen glandular at the top. Style 1. Stigma single or divided. Capsule usually of 3 cells, sometimes of 2, 5, 6, or 8, bursting laterally. Seeds numerous, attached to the inner angle of each cell. Herbs with a milky juice, rarely shrubby. Leaves mostly alternate. Flowers distinct, or (in *Jasione*) aggregate."

It is not easy to divine what is meant by Jussieu's expression of the Corolla being "*summo calyci inserta.*" Both those parts and the Stamens are really epigynous. We cannot trace the slightest relationship between this Order and the *Ericæ* or *Rhododendra.* But their milky, often bitter, quality, and in some New Holland species a very strong resemblance of habit, approaches them to the great natural class of Compound Syngenesious Flowers, from which their generally 3-celled, many-seeded, Capsule forms as wide an aberration, as the same sort of fruit in *Begonia* does from the natural Order of *Polygoneæ,* n. 28, to which that singular genus is otherwise so much akin. *Phytolacca* exhibits a somewhat similar anomaly in the *Atriplices,* n. 29.

Jussieu's Sections of *Campanulaceæ* are,

1. Anthers distinct. *Ceratostema* Juss. a Peruvian plant little known, *Forgesia* Commerson, *Mindium* Juss. (*Michauxia* L'Herit. Schreb. Gen. 840), *Canarina, Campanula,* fig. 193, *Trachelium, Roella, Gesneria, Cyphia* Berg., *Scævola,* fig. 194, and *Phyteuma.*

2. Anthers combined. *Lobelia,* fig. 195, and *Jasione.*

New Holland has greatly enriched this Order, and, under Mr. Brown's auspices, thrown much light upon it. He separates from hence, by the name of *Goodenoviæ,* Prodr. N. Holl. v. 1. 573, *Scævola,* fig. 194, along with the new genera of *Goodenia,* Sm. Tr. of Linn. Soc. v. 2. 346, *Velleia,* Sm. ib. v. 4. 217, and several more, first discovered by himself; amongst which not the least interesting is *Brunonia,* Sm. Tr. of Linn. Soc. v. 10. 365, whose affinity is among the most puzzling, approaching both the 55th and 56th of Jussieu's Orders. The *Goodenoviæ* are not milky. Their Pericarp is of 2, rarely 4, cells, with 1 or more Seeds in each cell. Their essential character is a cup-like membranous integument, entire or divided, embracing the thick abrupt Stigma.

Between them and the real *Campanulaceæ,* Mr. Brown interposes another new Order, *Stylideæ,* fig. 73-76, whose 2 Stamens are Gynandrous, like the *Orchideæ,* with twin Anthers; their Style, or Column, generally bent, and highly irritable. Capsule of 2 cells and 2 valves, with many Seeds.

If the 9th Class of the Jussieuan System, to which so many objections have just been started, were removed, it would unquestionably leave a great and absolute separation between the 8th and the 10th, as to natural affinity; while much is gained in that respect by its preservation, however faulty the characters.

CLASS 10. DICOTYLEDONES. COROLLA MONOPETALOUS, EPIGYNOUS. ANTHERS COMBINED.

" *Flowers tubular, aggregate in a Common Calyx, whence they are termed compound* (68), *upon a Common Receptacle* (63), *which is either naked, scaly, or hairy. Proper Calyx none, except the cuticle of the Seed, and the Seed-down which is often a continuation thereof. Corolla of* 1 *tubular Petal, standing on the Pistil (Germen); in some instances flosculous, having a regular limb, almost invariably 5-cleft; in others ligulate, the limb being extended into a lateral flat expansion, entire or toothed at it's extremity. Stamens definite, almost always 5, with distinct Filaments, inserted into the Corolla. Anthers united into a tube, very rarely approximated only. Germen inferior (with respect to the Corolla and Proper Calyx) simple, standing on the Common Receptacle. Style* 1, *passing through the tube formed by the Anthers. Stigma generally deeply divided, rarely single. Seed* 1, *either naked, or crowned with a border, wing or down. Albumen none. Radicle inferior. Flowers sometimes all flosculous, or all ligulate, in the same Calyx; or those of* *the centre are flosculous, those of the margin ligulate.*"

Exceptions to the above characters, of this most natural and very extensive Class, occur in the two last sections of the 55th Order, hereafter to be explained; as also in *Tussilago*, several of whose species are incompletely dioecious, and have disunited Anthers; in *Eclipta*, the Flowers, or Florets, of whose disk are 4-cleft and tetrandrous; in *Siegesbeckia flosculosa*, where they are 3-cleft and triandrous; and in *Seriphium*, as also in *Stæhelina uniflosculosa*, Prodr. Fl. Græc. v. 2. 162, which have only 1 Floret in each Calyx. The occasionally undivided or club-shaped Stigma is always, I believe, inefficient.

Ord. 53. CICHORACEÆ, fig. 57-60. "Florets all ligulate and perfect, fig. 59. Common Calyx various. Each Floret, entire or toothed at the apex, has a twin Stigma. Seed either naked, or feathery, fig. 60. Receptacle either naked, fig. 58, or covered with hairs or scales. Plants milky, herbaceous, often caulescent. Leaves alternate. Flowers usually yellow." Schkuhr has remarked that their Pollen is angular; in the tubular Florets it is spherical or oval. *Br. Tr. of Linn. Soc. v.* 12. 88.

This Order is equivalent to the first Section of the *Syngenesia Polygamia-æqualis* of Linnæus, of which *Sonchus*, *Hieracium*, *Picris*, fig. 57-60, *Leontodon*, *Tragopogon*, and *Cichorium* are examples, nor can any thing be more natural.

Ord. 54. CINAROCEPHALÆ, fig. 61-65. "Florets all flosculous, sometimes all perfect; sometimes partly neuter, fig. 64, or partly fertile, mixed with the perfect ones. Common Calyx of many rows of imbricated scales, either spinous or unarmed. Common Receptacle hairy, fig. 62, or more usually scaly. Neuter Florets, fig. 64, often irregular; the rest, fig. 65, regular, 5-cleft and pentandrous, with a simple or divided Stigma, often continuous, not jointed, with the Style. Seed with a hairy, fig. 62, or feathery Down. Stem herbaceous, rarely shrubby. Leaves alternate, often spinous. Flowers various in colour, terminal, rarely axillary."

These make the 2d, or capitate, Section of the same Class and Order of Linnæus, of which *Carlina*, *Cnicus*, *Carduus*, fig. 61, 62, and *Serratula* are examples: part of his 3d Order, *Polygamia-frustranea*, is likewise included, and part of his 5th, *Polygamia-segregata*, certainly with very great advantage.

Ord. 55. CORYMBIFERÆ, fig. 66-69. "Flowers either altogether flosculous, or radiated, fig. 66; the Florets of the Disk, in the latter case, being flosculous, fig. 68, those of the Margin ligulate, fig. 67. The flosculous ones are either all perfect, or the marginal ones are fertile or neuter; more rarely the central ones have Stamens only, the marginal ones only Pistils. The radiant Flowers never consist entirely of united Florets, but for the most part those of the disk are such, the rays being either furnished with perfect or imperfect Pistils, or sometimes without rudiments of any. Common Calyx of 1 leaf, or of many; either simple, or surrounded by a smaller exterior Calyx, or imbricated throughout: containing in general numerous Florets, sometimes but a few, or only one; the Common Receptacle being either naked, or clothed with hairs or scales, fig. 69, separating the Florets. The Florets are almost universally 5-cleft, rarely 3- or 4-cleft; the number of Stamens corresponding therewith: ligulate ones either entire or toothed at the end. Anthers very rarely unconnected. Stigmas a continuation of the Style; 2 in the perfect and fertile Florets; single, or wanting, in the barren and neuter ones. Seed either naked, or crowned with scales or down. Plants herbaceous, sometimes shrubby. Leaves more frequently alternate than opposite. Disk of the Flowers mostly yellow; rays often of the same, not unfrequently of a different, colour."

The 2d, 3d, and 4th Orders of Linnæus's *Syngenesia* (*Polygamia-superflua*, *P. frustranea* and *P. necessaria*,) compose this Order; as well as what Jussieu terms *Corymbiferæ anomalæ*, having perfectly separated Florets, either in the same Common Calyx, or in 2 different ones, on different plants, their Anthers being convergent, but not united. These last, wanting the Syngenesious character, Linnæus has placed, with much violence to nature, in his *Monoecia*, Class 21. *Iva*, *Clibadium*, *Parthenium*, *Ambrosia*, *Xanthium*, and *Nephelium* are the genera. They make the 8th and 9th Sections of Jussieu's *Corymbiferæ*, the other seven being marked by a naked or scaly Receptacle, winged or naked Seeds, and flosculous or radiated Flowers. The last character is not always well defined, nor free from variation. The change of flosculous, or regular, Florets, into ligulate, or radiant, or tubular and neuter, ones, is, in this tribe, analogous to the change of Stamens or Pistils into Petals, in the generality of double Flowers. Examples of these seven Sections are—

Sect. 1. Receptacle naked. Seed with down, or crown. Flowers flosculous. *Kuhnia*, referred by Linnæus to his *Pentandria Monogynia*, because of the separate Anthers; *Cacalia*, *Eupatorium*, *Xeranthemum*, *Gnaphalium*, *Filago*, and several others. *Mutisia* and *Barnadesia*, being evidently radiant, seem misplaced here. In *Gnaphalium* indeed the marginal Florets are more or less ligulate, though too minute to form a visible Radius. *Seriphium*, whose Calyx is single-flowered, is well brought hither from the now abolished Linnæan Order, *Syngenesia Monogamia*, and *Stoebe* from *Syng. Polyg.-segregata.*

Sect. 2. Recept. and seed as above. Flowers radiant. *Erigeron*, *Aster*, *Inula*, fig. 66-69, *Tussilago*, (whose Radius is very minute,) *Senecio*, *Tagetes*, *Doronicum*, &c.

Sect. 3. Recept. and Seed naked. Fl. radiant. *Calendula*, *Chrysanthemum*, *Matricaria*, *Bellis*, &c.

Sect. 4. Recept. and Seed naked. Fl. flosculous.

Cotula, Ethulia, Hippia, Tanacetum, Artemisia, &c. some of which have minute ligulate Florets in the Radius, and others approach towards the nature of double Flowers, by acquiring evident Rays.

Sect. 5. Recept. chaffy. Seed naked. Fl. usually radiant. *Tarchonanthus, Micropus, Anthemis, Achillea, Buphthalmum, Siegesbeckia,* &c.

Sect. 6. Recept. chaffy. Seed toothed or scaly at the crown. Fl. generally radiant. *Spilanthus* without, and *Verbesina* with rays, scarcely differ otherwise; *Bidens* and *Coreopsis* are in the same predicament, and often vary into each other; *Silphium, Helianthus, Rudbeckia,* &c.

Sect. 7. Recept. chaffy. Seed with a feathery, hairy, or bristly crown. Fl. mostly radiant. *Arctotis, Tridax, Amellus,* &c.

Sect. 8 and 9 have already been explained. The former is said to be monoecious, the latter dioecious, which is not uniformly correct. In fact this circumstance varies.

Mr. Brown, in a learned paper on this natural family of *Compositæ,* Tr. of Linn. Soc. v. 12. 76, lays much stress on the situation of the nerves, or principal vessels, of the Corolla of the tubular Florets, which is always alternate with their segments, not, as in all other plants, central, or running along the middle of each segment, though such do also, less universally, occur. The same writer notices that the Aestivation of the Florets is valvular, which is not indeed peculiar to them. This paper abounds with copious and most valuable critical remarks on the differences or affinities of particular genera.

CLASS 11. DICOTYLEDONES. COROLLA MONOPETALOUS, EPIGYNOUS. ANTHERS DISTINCT.

"*Proper Calyx*" (*Perianth*, 53 : 1) "*of* 1 *leaf, superior. Corolla of* 1 *petal, rarely of several united by their broad bases, superior, often regular. Stamens definite, inserted into the Corolla, with distinct*" (distant or divaricated) "*anthers. Germen simple. Style usually one, sometimes several, or wanting. Stigma simple or divided. Seed, or generally Pericarp, either capsular or pulpy, inferior, of* 1 *or many cells, with* 1 *or many Seeds.*"

Jussieu makes the separate Anthers the difference between this Class and the last, speaking of the present (so far, we must presume, as it consists of aggregate Flowers,) as rather superfluous. But the disposition of the vessels of the Corolla, noticed by Mr. Brown in the former Class, affords a decisive distinction.

Ord. 56. DIPSACEÆ. "Calyx single or double. Corolla tubular, with a divided limb. Stamens definite. Style and Stigma simple. Capsule generally single-seeded, not bursting, but resembling a naked Seed; very rarely composed of 2 or 3 single-seeded cells. Albumen none. Radicle superior. Stem usually herbaceous. Leaves opposite, rarely whorled. Flowers in a few instances distinct, in most aggregate, on a chaffy Common Receptacle, surrounded by a Common Calyx of many leaves."

Morina, *Dipsacus*, *Scabiosa*, fig. 5-7, *Knautia*, *Allionia*, and *Valeriana* are the genera, all except the last having aggregate Flowers.

Ord. 57. Rubiaceæ. "Calyx simple, it's limb almost always divided. Corolla regular, mostly tubular, with a divided limb. Stamens definite, 4 or 5, seldom more, inserted into the tube of the Corolla, alternate with it's segments, and agreeing with them in number. Germen inferior. Style 1, very rarely 2. Stigmas generally 2. Fruit either of 2 single-seeded lobes or grains, not bursting, and resembling naked seeds; or a capsular or pulpy Pericarp, often of 2 cells, with 1 or many Seeds in each; sometimes of only 1 cell, or of many: it is either crowned with the permanent Calyx, or naked" (having a scar where the Calyx has been). "Embryo oblong, slender, in a large, horny, lateral Albumen. Stem herbaceous, shrubby or arboreous. Leaves (simple) in a few instances whorled, in most opposite, their Footstalks combined at the base either by a simple sheathing intrafoliaceous Stipula, or a fringed membranous lax one."

A vast and important Order, which Jussieu has all the merit of having brought into due notice. The peculiar stipulation is, in the shrubby genera, a ready mark of distinction. There are eleven Sections, of which the first two might well constitute an Order by themselves; the rest are mostly tropical, with woody Stems. Mr.

Brown observes, Bot. of Terra Australis, 31, that it is scarcely possible to distinguish the *Rubiaceæ*, as now constituted, from the *Apocineæ*, Ord. 47, by characters taken from the fructification alone. This is but one confirmation amongst many, which the numerous exceptions throughout the Jussieuan classification afford, of the opinion of Linnæus, that natural orders are, as yet, not possibly to be defined by technical marks. Nevertheless, every attempt of the kind is useful, as tending to dissipate some obscurity, or to point out some truth; nor does the fact just mentioned at all invalidate the propriety, or necessity, of recurring to the fructification, for every principle of classical arrangement, as well as of generic distinction, though our incomplete knowledge of plants renders exceptions, to all our rules, inevitable.

Sect. 1. Fruit of 2 single-seeded grains. Stamens mostly four. Leaves mostly whorled, and Stem herbaceous. *Sherardia,* fig. 196, *Asperula, Galium, Crucianella, Valantia, Rubia,* and *Anthospermum,* the last not well characterized by Linnæus.

Sect. 2. Fruit the same. Stamens 4, rarely 5 or 6. Leaves generally opposite, connected by a fringed sheath. Stem usually herbaceous. *Houstonia, Knoxia, Spermacoce, Diodia, Galopina* Thunb. *Richardia,* and *Phyllis.*

Sect. 3. Pericarp simple, of 2 cells, with many Seeds. Stamens 4. Leaves opposite. Stem herbaceous or shrubby. *Hedyotis* and *Oldenlandia,* two genera which, as usually understood, are not distinct. But *O. pentandra*, *digyna*, and *depressa* of authors constitute a good genus, now bearing that name, Sm. in Rees's Cycl. v. 25, and belonging to Jussieu's *Saxifragæ*, Ord. 84. *Carphalea* Juss., Lamarck Illustr. t. 59, with *Gomozia*, *Petesia*, and *Catesbæa* of Linnæus, and a few Aubletian genera, compose the rest of this Section.

Sect. 4. Fruit the same. Stamens 5. Leaves opposite, as in all the following. Stem often shrubby. *Bellonia*, very little known, with *Virecta*, the beautiful *Mussænda*, the valuable *Cinchona*, fig. 197, the fragrant *Gardenia*, and magnificent *Portlandia*, are here the principal genera. *Genipa* and *Randia* are *Gardeniæ*.

Sect. 5. Fruit the same. Stam. 6 or more. Stem in some arboreous. *Coutarea* Aubl. t. 122, which is *Portlandia hexandra* Linn., *Hillia*, and *Duroia*, are all the genera mentioned.

Sect. 6. Fruit the same, with 2 Seeds. Stamens 4. Stem for the most part shrubby. *Chomelia* Jacq., *Pavetta*, *Ixora*, &c.

Sect. 7. Pericarp and Seeds the same. Stamens 5. Stem shrubby or arboreous. *Chiococca*, *Psychotria*, and *Coffea*, fig. 198, are the chief examples.

Sect. 8. Pericarp simple, of many single-seeded cells. Stam. 4, 5, or more. Stem often shrubby. *Erithalis*, *Laugeria*, *Guettarda*, &c., with a few of Commerson's, not very certain, genera. *Matthiola* of Plumier and

Linn. is a *Guettarda*. The former, as the oldest name, should have been retained.

Sect. 9. Peric. the same, with several Seeds in each cell. Stam. 5 or more. Stem shrubby or herbaceous. *Hamelia*, fig. 1Ϛ9, with *Patima* and *Sabicea* of Aublet.

Sect. 10. Flowers aggregate on a Common Receptacle, or rarely confluent. Stem woody, rarely herbaceous. *Mitchella*, the curious *Canephora* of Juss. Lamarck Illustr. t. 151, *Callicocca*, *Morinda*, *Nauclea*, *Cephalanthus*.

Sect. 11. Genera akin to *Rubiaceæ*, whose Fruit was not well known to Jussieu. *Serissa*, now found to belong to Sect. 7; *Pagamea*, and *Faramea* of Aublet, perhaps near *Callicocca;* and *Hydrophylax*, which should go to the 6th Section.

Ord. 58. Caprifolia. "Calyx superior, often with 2 Bracteas, or an outward Calyx, at its base" (or rather at the base of the Germen). "Corolla usually monopetalous, either regular, or irregular; in a few polypetalous, the Petals combined by their broad bases. Stamens definite, mostly 5; inserted into the tube of the monopetalous genera, alternate with the segments; in the others either standing on the Germen, alternate with the Petals, or attached to the middle of each Petal. Style 1, or wanting. Stigma 1, rarely 3. Fruit inferior, pulpy, or sometimes capsular, of 1 or many cells, with 1 or many Seeds in each. Embryo in a cavity in the upper part of the large solid Albumen. Stem woody, rarely herbaceous. Leaves generally opposite, seldom alternate; without any intermediate Stipulas."

There is a fallacy in the character of this Order, as stated by Jussieu, and the acknowledged diversity of insertion of the Stamens indicates, what it really is, a very heterogeneous Order. The outer Calyx, or rather pair of Bracteas, is not at the base of the proper Perianth, which is superior, but at the base of the Germen, which is inferior.

The 1st Section exemplifies the true *Caprifolia*, having a Style, and a monopetalous Corolla. These are *Linnæa*, fig. 200, *Triosteum*, and *Lonicera*, divided by Jussieu into *Symphoricarpos*, *Diervilla*, *Xylosteum*, and *Caprifolium*. *Lonicera corymbosa*, gathered by Mr. Menzies in Chili, proves not an *Ixora*, but a *Loranthus*. *Ovieda* is properly removed to the *Vitices*.

Loranthus, *Viscum* *, and *Rhizophora*, which constitute the 2d Section, have surely but little relationship to the foregoing, or perhaps to each other. Mr. Brown makes an Order of *Rhizophoreæ*, Bot. of Terra Austr. 17, akin to his *Cunoniaceæ*, see Ord. 84; and considers *Loranthus* as much allied to *Proteaceæ*.

The 3d Section consists of *Viburnum*, fig. 201, and

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* Seeds of *Viscum* are now germinating under my observation, some of which send out two radicles, as Duhamel remarks, Arb. v. 2. 356, though Gærtner never saw more than one. Such Seeds have in the centre a double *Plumula*, like an egg with two yolks.

Sambucus; for Jussieu's *Hortensia* is, according to all appearance, a *Hydrangea,* and, however near to these two genera in habit, very different in structure. This Section is characterized by 3 sessile Stigmas; though the Seed is solitary in *Viburnum.*

The 4th Section is formed of *Cornus* and *Hedera,* which have a polypetalous Corolla, and no external Calyx, except what is common to numerous Flowers. They are slightly akin. *Hedera* naturally belongs to the *Araliæ,* Ord. 59. Jussieu himself candidly expresses his dissatisfaction with the Order in question.

CLASS 12. DICOTYLEDONES. COROLLA POLYPETALOUS. STAMENS EPIGYNOUS.

"*Calyx of one leaf, superior. Petals of a definite number, standing on the Pistil, that is, on the margin of a gland crowning the Germen. Stamens definite, distinct, inserted into the same part, as many as the Petals, and alternate with them. Germen single*" (scarcely so in the 60th Order). "*Styles several, definite. Stigmas as many. Seeds as many, naked, or rarely in a Pericarp, the number of whose cells answers to the Styles. Embryo minute, oblong, in the upper part of a hard Albumen. Flowers umbellate* (48 : 7), *with or without a general or partial Involucrum, or both.*"

The Germen is considered *single,* because the Stamens are epigynous; and in fact the Receptacle of the Flower is simple, though the Seeds are often distinctly separated in many of the *Umbelliferæ*.

Ord. 59. ARALIÆ. "Calyx entire or toothed. Styles several. Fruit pulpy, or more rarely capsular, of many single-seeded cells. Stem woody or herbaceous. Leaves alternate, often compound; their Footstalk sheathing at the lower part. Umbel generally accompanied by an Involucrum."

Gastonia of Commerson, and *Polyscias* of Forster, with *Aralia*, *Cussonia* and *Panax*, compose this Order. *Sciodaphyllum* of Browne's Jamaica, like *Aralia capitata* of Jacquin, seems to me a species of *Hedera*. See the end of Ord. 58.

Ord. 60. UMBELLIFERÆ. "Calyx entire, or 5-toothed. Petals 5. Stamens 5. Styles and Stigmas 2. Fruit separable perpendicularly into 2 Seeds, variously shaped, pendulous from the top of a central, thread-shaped, often cloven, Receptacle. Flowers disposed in Umbels, and those generally divided into partial Umbels, *Umbellulæ*, each either with an Involucrum, or without, and in most instances regular, though in some anomalous. Stem herbaceous, rarely shrubby. Leaves alternate, for the most part repeatedly compound, rarely simple. Footstalks sheathing. Flowers white, or purplish, sometimes yellow."

One of the most natural of all Orders. "*Lagoecia* only has a solitary Style and Seed." They are distributed by Jussieu, as well as by Linnæus, according to the presence or absence of their general or partial *Involucrum.* Artedi, the early friend of Linnæus, who devoted himself to the study of the *Umbelliferæ*, suggested, or adopted, this plan. But those parts are often variable in the same species. The regularity or irregularity of the Petals also, and the perfection or partial imperfection of the Stamens or Pistils, have been resorted to, and do perhaps often afford good marks. The simple or divided form of the Petals is very material. But the figure, margin, ribs, angles, and surface of the Seeds yield excellent characters, allsufficient for the establishment of good genera, though not yet perfectly well applied to use. The earlier systematic botanists, and more recently Crantz and Cusson, have had this object in view. Hoffmann and Sprengel are now intent upon it. The *Prodromus* of the latter, published at Halle in 1813, does honour to it's author, though his *Species Umbelliferarum minùs cognitæ*, published five years later, may serve to show that his ideas of genera are not yet settled. It would be superfluous to give the detail of Jussieu's 4 Sections. Sprengel's are as follows:

1. Fruit compressed, flat. *Hasselquistia, Tordylium, Heracleum, Peucedanum*, fig. 203, *Ferula* and *Pastinaca* are good examples. *Hydrocotyle* appears misplaced here.

2. Fr. solid, winged at the margin. *Drusa*, De Cand. Ann. du Mus. v. 10, *Mulinum* Persoon, *Se-*

linum, *Angelica*, *Imperatoria*, *Thapsia*, *Laserpitium*, and *Artedia*, fig. 204.

3. Fr. with a bladdery skin. *Hermas*, *Cicuta*, *Physospermum* Cusson (*Ligusticum cornubiense* Linn.), and *Astrantia*, fig. 206.

4. Fr. with a thick coat. *Cachrys*, *Coriandrum*, *Dondia* Spreng. (*Astrantia Epipactis* Linn.), *Smyrnium*, fig. 207, *Aethusa*, and *Agasyllis* Spr. (*Bubon Galbanum* and *Sison salsum* Linn., &c.).

5. Fr. armed. *Daucus*, *Caucalis*, fig. 208, *Torilis* Adanson, *Sanicula*, *Bowlesia* Ruiz. and Pavon, *Cuminum*, *Oliveria* Ventenat, *Athamanta*, *Bubon*, *Tragium* Spr., *Eriocalia*, fig. 205 and 209, *Anthriscus* Pers., *Fischera* Spr. (*Azorella* Cavan. and Labill.), and *Bunium*.

6. Fr. solid, naked; either linear-lanceolate, as *Myrrhis* Morison, *Scandix*, fig. 210, *Chærophyllum*, *Schulzia* Spr., *Sium*, *Carum*, *Tenoria* Spr. chiefly extracted from *Bupleurum*, and *Meum* Tourn.—or oblong-ovate, as *Echinophora*, *Exoacantha* Labill. *Odontites* Spr. *Bolax* Commerson, *Spananthe* Jacq., *Apium*, *Pimpinella*, *Sison*, fig. 211, *Seseli*, *Oenanthe*, *Conium*, *Bupleurum*, *Cnidium* Cusson, *Ligusticum*, *Ammi*, and *Siler* Gærtn. (*Laserpitium aquilegifolium* Jacq.).

The following Linnæan genera are excluded from this system. *Crithmum*, which is referred to *Cachrys*; *Aegopodium* to *Sison*; *Anethum* to *Meum*; and *Phellandrium* to *Oenanthe*.

Eryngium, fig. 212, is either excluded or overlooked, by Prof. Sprengel, though unquestionably of this natural order. It's simple Umbel is merely condensed into a *Capitulum* (48 : 6), resembling the *Dipsaceæ*, Ord. 56, and *Cinarocephalæ*, Ord. 54, to which last the rigid spinous habit of the herbage approaches.

CLASS 13. DICOTYLEDONES. COROLLA POLYPETALOUS. STAMENS HYPOGYNOUS.

"*Calyx of one or many leaves; very rarely wanting. Petals hypogynous, that is, inserted under the Pistil, definite; very rarely indefinite; mostly distinct, sometimes united at the base into a kind of monopetalous Corolla; rarely entirely wanting. Stamens hypogynous, definite or indefinite, their Filaments usually distinct, but sometimes united into a tube, or more rarely collected into several bundles. Anthers distinct, except in*" (*some species of*) "*Viola and Balsamina* (Impatiens *Linn.*). *Germen superior, in numerous instances single, in some multiplied. Style one, or several, or wanting. Stigma* 1, *or several. Fruit superior, either single, with* 1 *or many cells, or more rarely multiplied, each separate Pericarp being of* 1 *cell.*"

No trace of connexion or affinity is discernible between this Class and the preceding, either in characters, habit, or qualities. The present is a great polypetalous hypogynous assemblage, of various discordant tribes and genera, as the 8th Class is a monopetalous one. The series of Orders is made as natural as circumstances will allow, in this, as in the former, case.

Ord. 61. RANUNCULACEÆ. "Calyx of many leaves, sometimes wanting. Petals usually 5. Stamens indefinite, except in *Myosurus*" (where however they are variable). "Anthers continuous with the Filaments. Germens several, indefinite or definite, rarely but one. Style one to each, rarely wanting, with a solitary Stigma. Capsules, rarely Berries, as many; in some instances single-seeded, and not bursting; in others many-seeded, splitting at the inner edge, half way down, into 2 valves, whose edges bear the Seeds. Embryo minute, in a cavity at the upper part of a large horny Albumen. Stem mostly herbaceous. Leaves alternate, or rarely, in *Clematis* and *Atragene*, opposite; some half sheathing; others compound, either pinnate or digitate; others again simple, and in that case either palmate, or otherwise lobed, their sinuses frequently pale."

Sect. 1. Capsules single-seeded, not bursting. (These are reckoned naked Seeds by Linnæus.) In *Hydrastis* they are Berries. *Clematis*, fig. 213, *Atragene*, *Thalictrum*, *Hydrastis*, *Anemone*, *Hamadryas* Commers. *Adonis*, *Ranunculus*, fig. 214, *Ficaria* and *Myosurus*.

Sect. 2. Caps. many-seeded, bursting internally. Petals irregular. (What Jussieu here terms Petals, are Nectaries according to Linnæus, the coloured Calyx of the former being Linnæus's Petals.) *Trol-*

lius, *Helleborus*, fig. 215, *Isopyrum*, *Nigella*, *Garidella*, *Aquilegia*, *Delphinium* and *Aconitum*.

Sect. 3. Caps. the same. Petals regular. *Caltha*, fig. 216, *Pæonia*, *Xanthorrhiza* and *Cimicifuga*.

Sect. 4. Germen single. Berry of 1 cell, with many Seeds, on a single lateral Receptacle. *Actæa*, fig. 217, and *Podophyllum*. Perhaps these, especially the last, might be removed to the next Order.

The *Ranunculaceæ* have lately been admirably illustrated by Prof. DeCandolle, in his *Regni Vegetabilis Systema Naturale*, v. 1. 127, both with respect to genera, species and synonyms. This learned writer observes, that the genuine plants of the Order in question have external or dorsal Anthers; the spurious ones, *Actæa* (which includes *Cimicifuga*), *Xanthorrhiza* and *Pæonia*, have interior Anthers, that is, turned towards the Pistils. He reduces *Atragene* to *Clematis;* except *A. zeylanica*, which constitutes a genus, called by him *Naravelia*, a name of barbarous origin, and it seems better that *Atragene* should remain to designate this genus.

Ord. 62. PAPAVERACEÆ. "Calyx mostly of 2 deciduous leaves. Petals generally 4. Stamens definite or indefinite. Germen 1. Style seldom present. Stigma divided. Fruit either a capsule or pod, mostly of 1 cell, with numerous Seeds, attached to lateral Receptacles. Stem herbaceous, very rarely shrubby. Leaves alternate. Juice in some species coloured."

Sect. 1. Stamens indefinite, *Sanguinaria*, *Arge-*

mone, *Papaver*, fig. 218, *Glaucium*, *Chelidonium* and *Bocconia*.

Sect. 2. Stam. definite. *Hypecoum* and *Fumaria*, fig. 38, 39; the latter an anomalous genus, much subdivided by some authors, on account of it's diversity of Pericarps.

The Order of *Nymphææ*, established by Mr. Salisbury, see Ord. 22, should be here introduced. An example of it is *Nuphar*, fig. 219.

Ord. 63. CRUCIFERÆ, fig. 23-30. "Calyx of 4 leaves, generally deciduous. Petals 4, disposed like a cross, whence the name of the Order, alternate with the Calyx-leaves, often furnished with Claws, and inserted into a disk, or glandular Receptacle, under the Germen. Stamens 6, likewise there inserted, tetradynamous, that is, 4 of them larger, in pairs, and 2 smaller solitary and opposite to each other, each individual, or each pair, opposite to a Calyx-leaf. Germen simple, standing on the above-mentioned disk, which sometimes swells into glands withinside of the Stamens. Style simple, or wanting. Stigma generally simple. Fruit a long Pod (61: 2), or short Pouch (61: 2), mostly of 2 cells, and 2 distinct valves, separating lengthwise, parallel to a membranous, thick-edged partition, which sometimes extends like a beak beyond the valves, and bears on both it's edges several, rarely solitary, Seeds. Albumen none. Plants herbaceous, seldom shrubby. Leaves alternate, in *Lunaria* partly opposite. Flowers seldom axillary, mostly terminal, racemose, or corymbose, sometimes panicled."

This Order, constituting Linnæus's 15th Class, is so natural in itself, that we can scarcely say whether any real affinity exists between it and any other. *Hypecoum*, in the last, betrays a slight resemblance, rather than a relationship, to this; as *Cleome* does in the following; but this last genus is incorrectly referred by Linnæus to his *Tetradynamia*, according to any rule that I can discover.

The genera of *Cruciferæ*, in which Jussieu follows Linnæus, are among the least satisfactory in either of their systems. Mr. Brown, in Ait. Hort. Kew., ed. 2. v. 4. has greatly improved them, taking into account the position and direction of their Cotyledons, whether spiral, doubled, or flat; *incumbent*, folded together upon the Embryo, or *accumbent*, folded contrarywise, their edges meeting the Embryo. The number of Seeds also lends occasional assistance, in the *Siliculosa* at least.

In some few instances, 2, or even 4, of the Stamens are wanting.

Crambe, *Coronopus*, *Peltaria*, whose Pouch does not burst, *Isatis*, *Vella*, *Teesdalia* Br., fig. 25-27, *Iberis*, *Thlaspi*, fig. 23, 24, *Lepidium*, *Farsetia*, and *Lunaria*, are among the best genera in *Tetradynamia Siliculosa*; as are

Arabis, *Brassica*, *Sinapis* and *Raphanus* in *T. Siliquosa*. Mr. Brown's *Malcomia* appears more satisfactory than his *Matthiola*, as separated from *Cheiranthus.*

Ord. 64. CAPPARIDES. "Calyx either of many leaves, or of one leaf in many segments. Petals 4 or 5, mostly alternate therewith. Stamens definite, or more frequently indefinite. Germen simple, often stalked, the stalk sometimes bearing the Stamens, it's base occasionally glandular at one side. Style 1, or more frequently wanting. Stigma solitary. Fruit many-seeded, either a Pod or Berry, of 1 cell, scarcely more. Seeds kidney-shaped, attached to parietal Receptacles. Albumen none. Embryo incurved, the Radicle lying above the Cotyledons. Stem herbaceous, shrubby, or arboreous. Leaves alternate, simple, rarely ternate, or digitate, sometimes furnished at the base with a pair of Stipulas, Prickles, or Glands."

Cleome, *Cadaba* Forsk., *Capparis*, fig. 20, *Sodada* Forsk., *Cratæva*, *Morisonia* and *Durio* are Jussieu's genera, to which *Boscia*, Lamarck Illustr. t. 395, is to be added.

The following very miscellaneous assemblage is subjoined, as akin to the true *Capparides; Marcgravia*, *Norantea* Aubl. (*Ascium* Schreb. Gen. 358), *Reseda*, fig. 17, *Drosera* and *Parnassia.*

Ord. 65. SAPINDI. "Calyx of many leaves, or of 1 leaf, mostly divided. Petals 4 or 5, inserted into a disk under the Germen; either simple and naked, or bearing hairs or glands, sometimes an inner petal, on their disk at the inside. Stamens generally 8, with distinct Filaments, inserted into the same disk. Germen simple. Styles 1 or 3. Stigmas 1, 2, or 3. Fruit fleshy, or capsular, of 1, 2, or 3, cells, or as many prominent lobes, each cell or lobe containing one Seed, attached to it's inner angle. Albumen none. Radicle incurved, upon the, often incurved, Cotyledons. Stem arboreous, or shrubby, rarely herbaceous. Leaves alternate."

Sect. 1. Petals double. *Cardiospermum*, *Paullinia*, *Sapindus*, *Talisia* Aubl. and *Aporetica* Forst.

Sect. 2. Petals simple. *Schmidelia* and *Ornitrophe* Commers. both perhaps one genus with *Aporetica; Euphoria* (*Dimocarpus* Willden. Sp. Pl. v. 2. 346), *Melicocca*, *Toulicia* Aubl. (*Ponæa* Schreb. Gen. 266), *Trigonis* Jacq. with *Molinæa* and *Cossignia* Commers. compose this section. Many of them require examination, and some are perhaps not distinct from *Cupania*, which not being hitherto well understood, is placed, with *Matayba*, *Enourea* and *Pekea* of Aublet, very different from it and from each other, in a doubtful Section at the end.

Ord. 66. ACERA. " Calyx of 1 leaf. Petals definite, rarely wanting, inserted around a hypogynous disk. Stamens inserted into the middle of the same disk, definite, but often not agreeing with the Petals in number. Germen simple, standing on the disk. Style and Stigma single, rarely 2. Pericarp of 2 or 3 cells or capsules. Seeds either solitary, or at most 3, in each, attached to the inner angle, some of them often abortive. Albumen none. Radicle lying on the Cotyledons. Stem arboreous or shrubby. Leaves opposite, without Stipulas. Flowers racemose or corymbose, their Stamens or Pistils often partially imperfect."

Aesculus, fig. 12, and *Acer*, fig. 221, are the only genera; with *Hippocratea*, and the obscure *Thryallis* of Linnæus, judged intermediate between this Order and the next. *Aesculus* is, as Jussieu indeed hints, full as much intermediate between the present and the last.

Ord. 67. Malpighiæ. "Calyx in 5 deep segments, permanent. Petals 5, alternate with the Calyx, inserted into a hypogynous disk, by their claws. Stamens 10, inserted into the same part, 5 of them opposite to the Petals, 5 intermediate ones to the Calyx, their Filaments sometimes connected at the base. Anthers roundish. Germen either simple, or 3-lobed. Styles 3. Stigmas 3 or 6. Fruit either of 3 Capsules, or simple with 3 cells. Seeds solitary in each Capsule or cell. Albumen none. Embryo with a straight radicle, the Cotyledons reflexed at their base. Stem shrubby. Leaves opposite, simple, with some traces of Stipulas. Flowerstalks terminal, or more generally axillary, either aggregate and single-flowered, or solitary and many-flowered, either umbellate, spiked, or panicled, each Stalk usually with a joint and 2 small scales about the middle."

Bannisteria and *Triopteris* have a tricapsular winged

Fruit; *Malpighia*, fig. 222, a simple Berry, or Drupa, with 3 bony Nuts. *Trigonia* Aubl. and *Erythroxylum* are considered doubtful; as having each a simple Style, and the former a long Capsule of 3 valves, with numerous woolly Seeds; the latter alternate Leaves, double Petals like the *Sapindi*, and a Drupa with 1 Seed, whose Cotyledons are not folded or reflexed at the base.

These ambiguous genera however form no link with the following Order, nor do we perceive a real approach towards that Order, in any characters of the *Malpighiæ*, though the learned author is commendably solicitous to indicate such, in the opposite Leaves, 3 Styles, and 3-celled Fruit.

Ord. 68. HYPERICA. "Calyx in 4 or 5 deep segments. Petals as many. Stamens numerous, united at the base into several sets. Anthers roundish. Germen simple. Styles several, with as many Stigmas: Fruit generally capsular, the number of it's cells and valves corresponding with the Styles, the partitions formed of the inflexed edges of the valves. Seeds very minute, attached to a Receptacle in the centre of the Fruit, either simple, or split into as many parts as there are valves. Embryo straight. Albumen none? Stem herbaceous, or more or less woody. Leaves opposite. Flowers oppositely corymbose, often terminal."

Ascyrum, Brathys and *Hypericum*, fig. 48-50, are all the genera. The latter has often been attempted to be divided, but hitherto not successfully. *Brathys* is reduced to *Hypericum* in Sm. Plant. Ic. t. 41. It is scarcely polyadelphous.

Ord. 69. GUTTIFERÆ. "Calyx either of a definite number of leaves or of segments, very rarely wanting. Petals definite, frequently 4. Stamens mostly indefinite, their Filaments rarely monadelphous, or polyadelphous. Anthers continuous with the Filaments. Germen simple. Style 1, or none. Stigma simple, or divided. Fruit generally of 1 cell, pulpy or capsular, in some closed, in others opening by valves, and containing 1 or many Seeds, inserted either into the central Receptacle, or into the sides of the Pericarp. Albumen none. Embryo straight, with spongy or callous Cotyledons. Trees or Shrubs, mostly turgid with a resinous juice. Leaves generally opposite, coriaceous, smooth, undivided and entire, with 1 central rib, and many transverse veins. Flowers axillary or terminal, with one or other organ of impregnation sometimes imperfect, so as to become Monoecious or Dioecious."

Sect. 1. Style none. *Gambogia*, *Clusia*, *Garcinia*, *Tovomita* Aubl., *Xanthe* Schreb. Gen. 710 (*Quapoya* Aubl.), and *Grias*. To which is to be added *Xanthochymus*, fig. 223, Roxb. Coromand. t. 196.

Sect. 2. Style one. *Symphonia* Schreb. Gen. 452 (*Moronobea* Aubl.), *Macoubea* Aubl., *Mammea*, *Ma-*

canea Juss. Aubl. t. 371, *Sterbeckia* Schreb. Gen. 360 (*Singana* Aubl.), *Mesua*, *Rheedia* and *Calophyllum*.

Sect. 3. Genera with alternate Leaves, allied on one hand to this Order, on the other to the following. *Vateria*, *Vatica*, *Elæocarpus*, and *Allophyllus*.

A noble and very natural Order, not detected by Linnæus, connecting the *Hyperica* with the *Aurantia*.

Ord. 70. AURANTIA. "Calyx of 1 leaf, often deeply divided. Petals definite, broad at the base, inserted around a hypogynous disk. Stamens inserted into the same disk, mostly definite, either distinct, monadelphous, or polyadelphous. Germen and Style simple. Stigma rarely divided. Fruit mostly pulpy, in some instances capsular, of 1 or many cells, with 1 or 2 Seeds in each. Albumen none. Embryo straight, upright. Stem arboreous or shrubby. Leaves alternate, simple, or rarely compound."

Sect. 1. Fruit single-seeded. Leaves without pellucid dots. These are spurious *Aurantia*. *Ximenia*, *Heisteria*, and *Fissilia* Commerson. The last is well referred to *Olax* by Vahl, Enum. v. 2. 33.

Sect. 2. Fruit many-seeded, pulpy. Leaves full of resinous pellucid dots. True *Aurantia*. *Bergera*, *Murræa* (which is also *Chalcas*), *Cookia* Sonnerat., *Citrus*, fig. 224; and *Limonia*; a most natural tribe.

Sect. 3. Fr. many-seeded, capsular. Leaves not dotted. Genera akin to *Aurantia*, and to the following Order (in our opinion rather nearer to the latter).

Ternstromia (*Tonabea* Juss. being the same genus), *Thea* and *Camellia*. These serve to connect the *Aurantia* and *Meliæ*, without much real affinity perhaps to either. They have some points of relationship to the *Malvaceæ*, Ord. 74; at least to *Gordonia* and *Stuartia*.

Ord. 71. MELIÆ. "Calyx of 1 leaf, more or less deeply divided. Petals 4 or 5, with broad claws, generally connected at the base. Stamens definite, as many, or more frequently twice as many; their Filaments united into a tube, or cup, toothed at the summit, each tooth either bearing, or overshadowing, a close-pressed internal Anther. Germen and Style single. Stigma rarely divided. Fruit pulpy, or more frequently capsular, of many cells, with 1 or 2 Seeds in each, the valves as many as the cells, each with a central partition. Stem shrubby or arboreous, with alternate branches. Leaves simple or compound, alternate, without Stipulas."

Sect. 1. Leaves simple. *Canella* (*Winterania* Juss.), *Symphonia*, *Tinus*, excluding the "Peruvian shrub," which is *Strigilia* of Cavanilles, Monad. t. 201., *Geruma* Forsk., *Aitonia*, *Quivisia* Commers. Lam. Illustr. t. 302, and *Turræa*, fig. 225, see Sm. Plant. Ic. t. 10-12.

Sect. 2. Leaves compound. *Ozophyllum* Schreb. (*Ticorea* Aubl.), *Sandoricum* Rumph., *Portesia* Juss. Lam. Illustr. t. 302, *Trichilia*, *Elcaja* Forsk., *Guarea*, *Ekebergia*, *Melia* and *Aquilicia* (which is *Leea*).

Sect. 3. Allied to *Meliæ.*—*Swietenia* and *Cedrela.*

Leea makes a connecting link with the following Order.

Ord. 72. VITES. "Calyx of 1 leaf, short, nearly entire. Petals definite, 4, 5, or 6, broad at the base. Stamens as many, opposite to the Petals, with separate Filaments, inserted into a hypogynous disk. Germen, Style if present, and Stigma, single. Berry of one or many cells, with one, or a definite number of bony Seeds, whose surface is unequal, and which are attached to the bottom of the fruit. Albumen none. Embryo descending, with straight Cotyledons. Stem shrubby, trailing or climbing, knotty. Leaves alternate, with Stipulas. Tendrils or Flower-stalks opposite to the Leaves."

Cissus and *Vitis*, fig. 226, are the only genera. Jussieu ingeniously points out an affinity to these in some of the shrubby *Gerania*, Ord. 73, confirmed by the acidity of the Leaves in some instances. This affinity serves well to introduce the following.

Ord. 73. GERANIA. "Calyx simple, of 5 leaves, or in 5 deep segments, permanent. Petals 5" (regular or irregular). "Stamens definite, their filaments connected at the base; some of the Anthers often wanting. Germen single. Style 1. Stigmas 5, oblong. Fruit of 5 cells, or 5 Capsules, each containing 1 or 2 Seeds. Albumen none. Stem slightly shrubby, or herbaceous. Leaves opposite or alternate, with Stipulas. Flowers opposite to the alternate Leaves, axillary at the opposite ones."

Geranium, fig. 31-35, from which are now so satisfactorily separated *Erodium* and *Pelargonium*, fig. 227, composes, with *Monsonia*, the whole of this Order. *Tropæolum*, fig. 228, *Impatiens* (*Balsamina* Juss.) and *Oxalis* are subjoined as related to those genera. In the first I confess myself unable to discern any affinity whatever with them, or to form any idea to what tribe it belongs. *Impatiens* is surely, as Jussieu hints, p. 237, more akin to his *Papaveraceæ*, Ord. 62. *Oxalis* I have long ago, Engl. Bot. t. 762, proposed removing to the *Rutaceæ*, see Ord. 81.

Ord. 74. MALVACEÆ. "Calyx in 5 segments, more or less deep, either simple, or accompanied by an external Calyx, of 1 or many leaves. Petals 5, equal, either distinct and hypogynous, or connected at the base, and united to the lower part of the tube of the Stamens, which are hypogynous, and either definite or indefinite. Their Filaments are either united, almost all the way up, into a tube, closely embracing the Style, and nearly as long, which bears the Petals at it's base, and is laden, at or about the top, with Anthers, each supported by it's own Filament, rarely sessile: or the Filaments are merely combined into a sort of cup, whose segments either all bear one or more Anthers, or some of them are without any. Germen one, in some instances stalked. Style mostly solitary, rarely several. Stigmas usually numerous, very rarely indeed solitary. Fruit either of many cells, and many valves, with partitions from the centre of each, or of many Capsules, generally bursting, rarely closed, crowded into an aggregate Fruit, either whorled round the base of the Style, or more rarely forming a head above the Receptacle. Seeds either 1 or more in each cell or Capsule, either inserted into the inner angle, or into the central columnar Receptacle, which connects all the cells or Capsules together. Albumen none. Cotyledons folded, bent over the Radicle. Stem arboreous, or shrubby, or herbaceous." (Bark with tough fibres.) "Leaves with Stipulas, alternate, mostly simple, occasionally digitate. Flowers axillary or terminal, very rarely with imperfectly separated organs."

Sect. 1. Stamens united into a tube bearing the Corolla, indefinite. Fruit of many capitate Capsules. *Palava* Cavan. and *Malope.*

Sect. 2. Stam. and Cor. as above. Capsules whorled, or crowded into one orbicular figure. *Malva, Althæa,* fig. 36, 37, *Lavatera, Malachra, Pavonia* Cav., *Urena, Napæa* and *Sida.*

Sect. 3. Stam. and Cor. the same. Fruit simple, of many cells. *Anoda* Cav., *Lagunæa* Schreb. Gen. 463, which comprehends *Laguna* and *Solandra* of Juss., *Hibiscus, Achania* Schreb. Gen. 469 (*Malvaviscus* Juss.), and *Gossypium.*

All these Sections compose a very natural assemblage of true *Malvaceæ*, or Linnæan *Columniferæ*. The following are more miscellaneous, or uncertain.

Sect. 4. Stam. united into a tube bearing the Corolla, definite Fruit of many cells. *Senra* Cav., *Fugosa* Juss. (*Cienfuegosia* Cav.), genuine *Malvaceæ*, as likewise appears to be *Plagianthus* Forst. t. 43. *Myrodia* Schr. Gen. 472 (*Quararibea* Aubl.) is suspected to be rather akin to the *Meliæ*, especially to *Turræa*. It has the smell of Melilot when dry.

Sect. 5. Stam. all fertile, definite or indefinite, united at the base into a small sessile cup. *Melochia*, *Ruizia* Cav., *Stuartia*, fig. 51, 52 (including *Malachodendrum*, as well as *Stuartia*, Juss. 292), *Gordonia*, *Hugonia*, *Bombax*, and *Adansonia*. To these the 3d Section of the *Aurantia*, Ord. 70, might perhaps be transferred.

Sect. 6. Stam. united as in the last, partly imperfect; definite, rarely indefinite. *Pentapetes*, *Pterospermum* Schr. Gen. 461., *Theobroma*, *Abroma*, *Bubroma* Schreb. (*Guazuma* Juss.), *Melhania* Forsk., *Assonia* Schreb. 460, (including *Dombeya* Cav.) and *Büttneria*.

Sect. 7. Stam. united into a cup, closely surrounding the Germen, and elevated with it on a stalk; generally definite, and all fertile. *Ayenia*, *Kleinhovia*, *Helicteres* and *Sterculia*.

Sect. 8. Akin to *Malvaceæ*. *Carolinea* (*Pachira* Aubl.).

There is not the slightest relationship between this 74th Order and the four following.

Ord. 75. MAGNOLIÆ. "Calyx of a definite number of leaves, sometimes with external scales. Petals mostly definite, truly hypogynous," (inserted into the Receptacle of the Flower, which supports the Germens). "Stamens numerous, distinct, inserted into the same part. Anthers continuous with the Filaments. Germens several, definite or indefinite, on a Common Receptacle. Styles as many, or wanting. Stigmas as many. Capsules or Berries as many, each of 1 cell, with 1 or many Seeds; sometimes coalescing into one fruit. Albumen none." (DeCandolle rightly says fleshy.) "Embryo straight. Stem shrubby or arboreous. Leaves alternate, mostly undivided and entire; each embraced while young by a Stipula sheathing the branch, and rolled up, as in *Ficus*, into a sort of horn, making a terminal bud. Each such Stipula soon falls off, leaving an annular scar. Flowers terminal or axillary." (The Stipulas of *Liriodendrum* are in pairs, and rather more durable.)

True *Magnoliæ* are, *Wintera* Schreb Gen. 368 (*Drimys* Forst.), *Illicium*, *Michelia*, *Magnolia*, fig. 229, *Talauma* Juss. (Plumier's original *Magnolia*), *Liriodendrum*, and *Mayna* Aubl., to which Prof. DeCandolle, who has illustrated this Order, in his Syst. v. 1. 439, adds *Tasmannia*, a New Holland genus of Mr. Brown.

DeCandolle, in the same work, 395, establishes a new Order, by the name of *Dilleniaceæ,* composed of *Dillenia,* fig. 230, 231, and *Curatella,* put, with *Ochna* and *Quassia,* at the end of the *Magnoliæ* by Jussieu. This new Order, more approaching the *Ranunculaceæ* in character, though very wide of them in habit, is thus defined.

"Calyx of 5 permanent leaves. Petals 5, deciduous. Stamens indefinite. Anthers continuous, internal or lateral. Germens indefinite, sometimes by abortion or coalition solitary, each with 1 Style or Stigma. Albumen fleshy. Shrubs or trees, with simple, usually alternate, leaves." Hither are referred, besides the two genera above named, *Tetracera* (including Forster's *Euryandra, Tigarea* of Aubl. and *Wahlbomia* of Thunb.); *Delima, Candollea* Labill.; *Pleurandra* Labill., *Hibbertia, Wormia,* and several others, whose limits may by some botanists be disputed.

Ord. 76. ANONÆ. "Calyx short, 3-lobed, permanent. Petals 6; the 3 outermost resembling an inner Calyx. Stamens numerous, consisting of nearly sessile Anthers, covering a hemispherical Receptacle, each of them nearly quadrangular, broadest at the top. Germens numerous, occupying the centre of the Receptacle, much crowded, hardly to be distinguished from the Anthers, and in a manner covered by them. Styles as many, short, or wanting. Stigmas 1 to each. Berries or Capsules as many, with 1 or more Seeds, and either distinct, with or without a partial stalk to each from the Common Receptacle, or confluent into a single pulpy Fruit, under whose bark are numerous cells, one for each Seed. Outer Skin of the Seed (62 : 4) coriaceous; inner membranous, with many inward folds, introduced between the transverse lobes of the large solid Albumen, in which, at the Scar, is lodged the minute Embryo. Stem arboreous or shrubby, alternately branched; the Bark mostly reticulated. Leaves alternate, simple, undivided and entire, without Stipulas. Flowers axillary."

Anona, *Unona*, *Uvaria*, *Cananga* Aubl., and *Xylopia*, are Jussieu's genera. DeCandolle has added several new genera, as well as a multitude of species, with many illustrations. He invents the term *Carpella*, Partial Fruits, for the aggregate Pericarps of this tribe.

Ord. 77. MENISPERMA. "Calyx of a definite number of leaves. Petals definite, opposite thereto, sometimes with each a, likewise opposite, internal scale. Stamens definite, as many as the Petals, and opposite to them. Germens several, definite, with each a Style and Stigma. Fruits as many, pulpy or capsular, kidney-shaped, each with 1 Seed of the same shape, several of them, sometimes all but one, abortive. Embryo flat, small, with thin Cotyledons, in the top of a large incurved Albumen. (See below.) Stem shrubby, usually trailing. Leaves alternate," (generally) "simple, without Stipulas. Flowers axillary or terminal, often in spiked or racemose tufts, with a Bractea to each tuft. Stamens and Pistils generally separated, more or less completely."

Cissampelos, Menispermum, Leæba Forsk., *Epibaterium* Forst., and *Abuta* Aubl.

Prof. DeCandolle has treated of this Order, by the name of *Menispermeæ*, Syst. v. 1. 509, with the following principal characters. "Flowers separated. Calyx-leaves and Petals definite, deciduous. Barren Fl. with usually monadelphous Stamens, opposite to the Petals, and agreeing with them in number, or else numerous, in several rows. Fertile Fl. with a few distinct, rarely combined, Germens. Seeds compressed, generally crescent-shaped. Cotyledons remarkable, in some instances, for being distant, and lodged in 2 different cells of the Seed. Albumen none, or very small." (This agrees with Gærtner's figures and descriptions, better than Jussieu's account, yet they are not irreconcilable.) "Leaves in some genera, once, twice or thrice ternate."

Sect. 1. Leaves compound. *Lardizabala* Fl. Peruv., *Stauntonia* DeCand. and *Bursaia* Petit-Thuars.

Sect. 2. Leaves simple. *Spirospermum* Petit-Th., *Cocculus* DeCand. a genus of 46 species, *Pselium* Lour., *Cissampelos, Menispermum, Abuta*, and *Agdestis* of Moç and Sessé Fl. Mex. *Schizandra* of Michaux stands alone, as of spurious affinity, because of a disagreement in number between the Anthers and integuments of the Flower.

Ord. 78. BERBERIDES. "Calyx of a definite number of leaves or segments. Petals definite, as many as the Calyx-leaves, and often opposite to them, sometimes simple, sometimes furnished with an internal Petal at the base. Stamens definite, as many as the Petals, and opposite thereto. Anthers united with the Filaments, bursting from the bottom upwards, by a valve at each side. Germen simple. Style 1 or none. Stigma often single. Berry or Capsule of 1 cell, frequently with several Seeds, inserted into the bottom of the cell. Embryo descending, flat, surrounded by a fleshy Albumen. Stem shrubby or herbaceous. Leaves simple or compound, mostly alternate, with, or more often without, Stipulas."

Berberis, *Leontice*, *Epimedium*, fig. 234, *Rinorea* Aubl. and *Conoria* of the same author, compose this singular Order. *Riana* Aubl., *Corynocarpus* Forst., *Barreria* Schreb. 598 (*Poraqueiba* Aubl.), *Hamamelis*, *Othera* Thunb., and *Rapanea* Aubl. are subjoined, as more or less allied, though in some instances slightly, to the above.

Ord. 79. TILIACEÆ. "Calyx of several leaves or segments. Petals definite, distinct, in *Sloanea* wanting, alternate with the divisions of the Calyx, and generally as many. Stamens mostly indefinite, and distinct. Germen simple. Style 1, rarely many, or none at all. Stigma simple or divided. Fruit pulpy or capsular, generally of many cells, and as many valves with central partitions. Seeds 1 or more in each cell. Embryo flat, in a fleshy Albumen. Stem arboreous or shrubby, seldom herbaceous. Leaves alternate, simple, with Stipulas."

Sect. 1. Stamens definite, more or less monadelphous. Doubtful *Tiliaceæ*. *Waltheria*, *Hermannia*, and *Mahernia*. These would surely be better placed with the *Malvaceæ*. The Cotyledons of the two latter agree full as well with them as with *Tilia*.

Sect. 2. Stam. distinct, mostly indefinite. Fruit of several cells. True *Tiliaceæ*. *Antichorus*, *Corchorus*, *Heliocarpus*, *Triumfetta*, *Sparmannia*, *Sloanea*, *Aubletia* Schreb. 353 (*Apeiba* Aubl.), *Muntingia*, *Flacourtia* Commers., *Oncoba* Forsk. Lam. Illustr. t. 471., *Grewia* and *Tilia*, fig. 235. *Stuartia* is to be excluded; see Ord. 74.

Sect. 3. Akin to *Tiliaceæ*. Fruit of 1 cell. *Bixa*, *Laetia* and Aublet's and Schreber's *Banara*. The first seems a genuine *Tiliacea*.

Ord. 80. CISTI. "Calyx in 5 deep segments. Petals 5. Stamens numerous. Germen simple. Style 1. Stigma 1. Capsule either of 1 cell, with 3 valves, or of many cells with many valves, the numerous small Seeds attached to the centre of each, which either projects so as to form a partition, or is merely a longitudinal line. Embryo inclosed in a thin Albumen, it's Radicle incurved upon the Cotyledons. Stem woody or herbaceous. Leaves mostly opposite, with or without Stipulas. Flowers either spiked, or solitary, or corymbose, somewhat umbellate."

Cistus and *Helianthemum*, fig. 236, constitute the genuine plants of this Order, the latter being separated as a genus from *Cistus*, by Jussieu and others, because the Capsule is supposed to have only 3 valves, and 1 cell, instead of 5 or 10 cells and valves. But *H. thymifolium* has really 3 cells, and the habit of the plants scarcely warrants such a separation. *Helianthemum* is inadmissible as a name, being the same in meaning as *Helianthus*.

The following genera are supposed related to the *Cisti*, as having a Capsule of 3 valves, into which the Seeds are inserted; but the number of their Stamens is definite. *Viola*, whose affinity is one of the most puzzling; *Piriqueta* Aubl., now referred by Schreber, Gen. 827, to *Turnera; Piparea* Aubl., of which too little is known to afford matter for much conjecture; and *Tachibota* of the same author (*Salmasia* Schreb. 201.) scarcely less obscure. *Viola* is perhaps, like *Turnera*, more akin to Jussieu's *Ficoideæ*, Ord. 87, than to the *Cisti*.

Ord. 81. RUTACEÆ. "Calyx of 1 leaf, often in 5 deep segments. Petals mostly 5, alternate therewith. Stamens definite, distinct, mostly ten, alternately opposite to the Petals and Calyx. Germen simple. Style 1. Stigma single, rarely divided. Fruit of many cells, or many Capsules, usually 5, with one or more Seeds attached to the inner angle. Embryo flat, in a fleshy Albumen. Stem herbaceous, or shrubby, rarely arboreous. Leaves in some alternate, naked;

in others mostly opposite, with Stipulas. Flowers axillary or terminal."

Sect. 1. Leaves with Stipulas, generally opposite. *Tribulus*, *Fagonia*, *Zygophyllum*, and *Guaiacum*.

Sect. 2. Leaves alternate, without Stipulas. *Ruta*, *Peganum* and *Dictamnus*.

Sect. 3. Genera akin to *Rutaceæ*, *Melianthus*, *Diosma*, *Empleurum*, and *Aruba* Aubl.

Such is Jussieu's view of this Order, which requires great emendation, and respecting which Mr. Brown has made very important remarks in his Bot. of Terra Australis, 13. Five New Holland genera had indeed previously been added to it, *Boronia*, fig. 237, 238, *Corræa*, *Eriostemon*, *Crowea* and *Zieria*, by the writer of this, who first also referred *Melicope* of Forster to this family, see Rees's Cyclop. v. 23. *Phebalium* of Ventenat also belongs to it. To these Mr. Brown adds *Fagara*, *Xanthoxylon*, *Iambolifera*, *Calodendrum*, *Euodia*, *Pilocarpus*, *Empleurum*, *Dictamnus*, *Cusparia* Humb. and Bonpl., *Ticorea* and *Galipea* of Aublet, and perhaps the little-known *Monnieria*, as well as *Diosma*, from which last he would name the Order in question *Diosmeæ*; *Ruta* and *Peganum*, though admissible into it, not being calculated to give a clear idea of this very natural assemblage. The same learned writer speaks of two other New Holland genera, as belonging to his *Diosmeæ*, though paradoxical in character. One of them, not yet named, has a Calyx in 10 divisions, 10 Petals, and an indefinite number of perigynous Stamens! Another, *Diplolæna*, found originally by Dampier, and figured in his Voyage, v. 3. 110. t. 3. f. 3, bears a double Involucrum, containing many decandrous flowers, with Stamens and Pistils proper to the Order, but only a few irregularly-placed scales in the place of Perianth and Petals!

Jussieu's first Section undoubtedly constitutes a distinct Order, which Mr. Brown names *Zygophylleæ*. *Melianthus*, to whatever it may belong, (surely not, as Jussieu hints, to *Tropæolum*,) has little affinity to *Diosmeæ*, or *Zygophylleæ*.

Whether *Oxalis* may be admitted into the former, as being, in the occasionally lobed Filaments, elastic *Arillus*, acid flavour, and number of parts, allied to *Boronia* and *Eriostemon*, I merely beg leave to suggest, till it can be more decisively placed elsewhere. What has commonly been taken for an elastic *Arillus* in the *Diosmeæ* or true *Rutaceæ* may, as in *Euphorbiæ*, be only the inner coat of the Capsule, according to the opinion of Jussieu and Richard.

Ord. 82. CARYOPHYLLEÆ. "Calyx of 1 leaf, mostly permanent, either tubular, or deeply divided. Petals definite, seldom wanting, alternate with the segments of the Calyx, and equal to them in number, generally with Claws. Stamens definite, sometimes fewer than the Petals, but more frequently the same in number, and alternate therewith, or twice as many, and alternately inserted upon them or under the Germen, which is always simple. Styles several, rarely solitary, with the same number of Stigmas. Fruit capsular, of 1 or several cells, with numerous Seeds, on a central Receptacle. Embryo incurved, surrounding a farinaceous Albumen. Stem mostly herbaceous. Leaves opposite, combined at the base, or rarely whorled; in a few instances accompanied by Stipulas, but more usually without. Flowers either axillary, or more commonly terminal."

A large and very natural Order, much more akin, except in having Petals, to some of Jussieu's earlier Orders, as the *Amaranthi*, both in habit, nature of the Albumen, and even insertion of Stamens, rightly considered. But the laws of system, with regard to the Corolla, have almost obliged this learned author to place these two families widely apart, which necessity is rendered somewhat less unfortunate, by an agreement, as to the Albumen, with the 1st Order of the next Class. The *Caryophylleæ* are chiefly of European growth, and their genera have scarcely undergone any controversy, or received any addition or alteration, except *Cucubalus*, since their establishment by Linnæus, who first reduced them to any thing like scientific order. Jussieu's Sections are the following. Number, it must be observed, is often variable in these plants.

Sect. 1. Calyx deeply divided. Stamens 3. Style 1, or more frequently 3. *Ortegia*, *Loeflingia*, *Holo-*

steum, fig. 239, *Polycarpon*, *Donatia* Forst., *Mollugo*, *Minuartia* and *Queria*.

Sect. 2. Cal. the same. Stam. 4. Styles 2 or 4. *Buffonia* and *Sagina*.

Sect. 3. Cal. the same. Stam. 5 to 8. Styles 2, 3, or 4. *Alsine* (*A. media* is a *Stellaria*. Fl. Brit. 473), *Pharnaceum*, *Moehringia* and *Elatine*.

Sect. 4. Cal. the same. Stam. 10. Styles 3 or 5. *Bergia*, *Spergula*, *Cerastium*, *Cherleria*, *Arenaria* and *Stellaria*, fig. 240. (*Arenaria*, *Alsine* and *Holosteum* vary into each other, except the last may be determined, as I believe, by it's jagged Petals.)

Sect. 5. Cal. tubular. Stam. 10, 5 alternate ones generally attached to the Petals. Styles 2, 3, or 5. *Gypsophila*, *Saponaria*, *Dianthus*, fig. 15, 16, *Silene*, *Cucubalus*, *Lychnis* and *Agrostemma*.

Sect. 6. Cal. the same. Stam. fewer than 10. Styles 2 or 3. *Velezia*, *Drypis*, and *Sarothra*.

Sect. 7. Genera akin to *Caryophylleæ*. *Rotala*, *Frankenia*, fig. 241, *Linum* and *Lechea*. The latter may be referred to Sect. 1. *Rotala* belongs, as Jussieu suspected, to his *Salicariæ*, Ord. 91. *Linum* is very ambiguous, and it's affinity has not been satisfactorily determined by any botanist. *Frankenia* bears some relationship to the *Ficoideæ*, Ord. 87.

CLASS 14. DICOTYLEDONES. COROLLA POLYPETALOUS. STAMENS PERIGYNOUS.

" *Calyx of one leaf, superior or inferior, more or less* *deeply divided. Corolla perigynous, that is, inserted into some part of the Calyx, of several Petals, sometimes wanting, more rarely monopetalous, from an union of the Petals into one. Stamens inserted into the Calyx or Corolla, definite or indefinite, for the most part distinct, though sometimes with combined Filaments. Germen superior, single or multiplied, or rarely inferior and simple. Each Germen has one or more Styles, or none at all. Stigma undivided or divided. Fruit sometimes single, whether superior or inferior, of one or many cells; more rarely aggregate, superior, each Pericarp of one cell. Flowers sometimes, by imperfection of organs, separated.*"

Ord. 83. SEMPERVIVÆ. "Calyx inferior, in a definite number of deep segments. Petals definite, as many as the segments of the Calyx, and inserted into it's base alternately with them; or more rarely the Corolla is monopetalous, either tubular, or deeply divided. Stamens either as many as the Petals, and alternate with them, or twice as many, inserted alternately into their claws, and into the base of the Calyx. Anthers roundish. Germens several, equal to the Petals in number, united at their base or the inner side, glandular at the outer, the glands sometimes assuming the form of scales. Styles and Stigmas 1 to each Germen. Capsules as many, each of 1 cell, dividing at the inner edge into 2 valves, whose margins bear the numerous Seeds. Embryo incurved, surrounding a farinaceous Albumen. Stem herbaceous, or somewhat shrubby. Leaves opposite or alternate, succulent."

Tillæa, *Crassula*, *Cotyledon*, *Rhodiola*, *Sedum*, *Sempervivum*, fig. 242, and the variable genus *Septas*, perhaps not distinct from *Crassula*, are all Jussieu's certain genera; *Penthorum* being placed at the end, as their ally. This last however is as genuine a specimen of the Order as any of them, the Capsules being only more united into one, opening at the inner margin of each cell, as in the rest, and by no means *circumscissæ*, or bursting all round, as the author, by some accident, has been led to suppose. The Petals are often partly or entirely wanting, in which case the segments of the Calyx become multiplied.

Ord. 84. SAXIFRAGÆ. " Calyx either superior, or more frequently inferior, in 4 or 5 segments. Petals 4 or 5, rarely wanting, inserted into the upper part of the Calyx, alternate with it's segments. Stamens as many, or rather twice as many, inserted into the same part. Germen simple. Styles and Stigmas 2. Fruit often capsular, many-seeded, of 1 or 2 cells, opening at the top with 2 valves, whose inflexion forms the partitions. Embryo incurved, surrounding a farinaceous, or somewhat solid, Albumen. Stem usually herbaceous. Leaves alternate, rarely opposite, occasionally rather succulent."

Sect. 1. Fruit superior, capsular, with 2 beaks at the top. *Heuchera*, *Saxifraga*, fig. 243, *Tiarella* and

Mitella. The late Mr. Dryander removed *Galax* hither, from Jussieu's undetermined genera, 420.

Sect. 2. Fruit inferior, capsular or pulpy. *Chrysosplenium* and *Adoxa.*

Sect. 3. Genera allied to *Saxifragæ. Weinmannia, Cunonia,* and *Hydrangea.*

Mr. Brown proposes a new Order, Bot. of Terra Austr. 16, by the name of *Cunoniaceæ,* to receive *Weinmannia, Cunonia, Ceratopetalum,* fig. 244, *Calycomis,* and *Codia,* to which *Bauera* Sm. (Curt. Mag. t. 715) may be referred, but in a separate section.

Ord. 85. CACTI. "Calyx superior, divided at the summit. Petals either definite or indefinite, inserted into the upper part of the Calyx. Stamens definite or indefinite, inserted into the same part. Germen inferior, simple. Style one. Stigma divided. Berry of 1 cell, with many Seeds inserted into it's sides. Stem shrubby or arborescent. Leaves alternate, often wanting."

Sect. 1. Petals and Stamens definite. *Ribes.*

Sect. 2. Pet. and Stam. indefinite. *Cactus.*

This Order serves as a connecting link between *Saxifragæ* and *Portulaceæ,* but the affinity between it's two Sections we must acknowledge to be rather slight.

Ord. 86. PORTULACEÆ. "Calyx inferior, divided at the summit. Corolla of a definite number of Petals, rarely monopetalous or wanting, inserted into the base or middle of the Calyx, mostly alternate with it's segments, when the number of it's divisions agrees therewith. Stamens definite, or rarely indefinite, inserted into the same part. Germen simple. Styles 1, 2, or 3, rarely wanting. Stigmas often numerous. Capsule of 1 or many cells, each containing 1 or many Seeds. Embryo incurved, surrounding a farinaceous, or somewhat fleshy, Albumen. Herbs or Shrubs of a succulent habit, rarely arboreous. Leaves opposite or alternate, often juicy."

Sect. 1. Fruit of 1 cell. *Portulaca*, *Talinum*, *Turnera*, *Bacopa* Aubl., *Montia*, fig. 247, *Rokejeka* Forsk., *Tamarix*, *Telephium*, *Corrigiola*, *Scleranthus*, and *Gymnocarpus* Forsk., which last is certainly a *Trianthema*.

Sect. 2. Fruit of many cells. *Trianthema*, *Limeum*, *Claytonia*, and *Gisekia*.

This Order, in having petals, differs from the *Polygoneæ*, 28, much as the *Caryophylleæ*, 82, do from the *Amaranthi*, 30.

Ord. 87. FICOIDEÆ. " Calyx inferior or superior, of 1 leaf, in a definite number of segments. Petals mostly indefinite, inserted into the upper part of the Calyx, sometimes wanting, in which case the inside of the latter is coloured. Stamens more than 12, often very numerous, inserted into the same part. Anthers oblong, incumbent. Germen simple. Styles several. Stigmas as many. Capsule or Berry superior or inferior, of as many cells as there are Styles, with numerous Seeds in each, attached to the inner angle of the cell. Embryo incurved, surrounding a farinaceous Albumen. Stem herbaceous, or slightly shrubby. Leaves opposite or alternate, mostly succulent, very various in shape."

Sect. 1. Germen superior. *Reaumuria*, *Nitraria*, *Sesuvium*, *Aizoon*, *Glinus*, and *Orygia* Forsk.

Sect. 2. Germen inferior. *Mesembryanthemum*, fig. 248, and *Tetragonia*.

Ord. 88. ONAGRÆ. "Calyx superior, of 1 leaf, tubular; it's limb divided, either permanent or deciduous. Petals definite, inserted into the upper part of the Calyx, alternate with it's segments. Stamens definite, inserted into the same part, either as many, or twice as many, as the Petals, rarely still more numerous. Germen simple. Style mostly solitary. Stigma either deeply divided, or undivided. Fruit capsular or pulpy, inferior, or rarely half-inferior, usually of many cells, with many Seeds in each, rarely of only 1 cell; sometimes crowned with the limb of the Calyx, sometimes naked at the top. Embryo destitute of Albumen. Stem herbaceous or shrubby. Leaves alternate or opposite."

Sect. 1. Styles several. Intermediate genera, between the *Ficoideæ* and *Onagræ*. *Mocanera* Juss. (*Visnea* Linn. Suppl.), *Vahlia*, and *Haloragis* Schreb. 267 (*Cercodea* Soland. and Juss.).

Sect. 2. Style 1. Fruit capsular. Stamens as many as the Petals. *Montinia*, *Serpicula*, *Circæa* and *Ludwigia*.

Sect. 3. Style and Fr. the same. Stamens twice as many as the Petals. *Jussiæa*, *Oenothera*, *Epilobium*, fig. 249, *Gaura*, *Cacoucia* Aubl., *Combretum*, and *Guiera* Juss. Lam. Illustr. t. 360.

Sect. 4. Style 1. Fr. pulpy. Akin to *Myrti*, but differing in their definite Stamens. *Fuchsia*, fig. 250, *Petaloma* Schreb. 802 (*Mouriria* Aubl.), *Ophira*, *Bæckea*, *Memecylon*, *Jambolifera*, *Escallonia*, *Sirium* and *Santalum*.

Sect. 5. Polyandrous genera, akin to the *Onagræ*. *Mentzelia* and *Loasa*.

Mr. Brown has established an Order, entitled *Halorageæ*, Bot. of Terra Austr. 17, out of *Haloragis*, *Meionectes*, a New Holl. genus, *Proserpinaca*, *Myriophyllum*, fig. 251, *Serpicula*, *Gonocarpus*, *Hippuris*, fig. 252, and *Callitriche*. See Ord. 6, to which several of these, as being supposed monocotyledonous, because they are aquatics, were referred. *Petaloma*, *Bæckea*, *Memecylon* and *Jambolifera* are indubitably *Myrti*.

Combretaceæ, Brown Terra Austr. 16, another new Order, contains *Nyssa*, *Combretum*, *Bucida*, *Terminalia*, *Cacoucia* Aubl., *Quisqualis*, *Getonia* Roxb., *Conocarpus*, and a new decandrous genus with a winged fruit, found by the last-named botanist in the East Indies. These are, in many instances, furnished with Petals, and therefore must, in Jussieu's system, stand near the *Onagræ*, though allied to his *Elæagni*, and to the *Santalaceæ* of Brown. See Ord. 24. The Germen of the *Combretaceæ* is of one cell, containing from 1 to 4 rudiments of Seeds, pendulous from the top of the cell, only one of which is perfected. Albumen none. Cotyledons leafy, generally involute. Radicle superior. Plumula inconspicuous. Stamens twice as many as the segments of the Calyx, or, if only the same number, alternate therewith.

Ord. 89. MYRTI. "Calyx of 1 leaf, pitcher-shaped, or tubular, superior, or rarely only half-superior, either naked or with 2 scales at the base. Petals definite, inserted into the upper part of the Calyx, alternate with it's segments, and equal to them in number. Stamens indefinite" (in some definite), "inserted into the same part under the Petals. Anthers small, roundish, curved, bordering the dilated summit of each Filament. Germen simple, inferior, or occasionally half-inferior. Style 1. Stigma single, rarely divided. Fruit a Berry, Drupa, or sometimes a Capsule, of 1 or many cells, with 1 or many Seeds. Embryo straight or incurved, destitute of Albumen. Stem arboreous or shrubby, with usually opposite branches. Leaves mostly opposite and simple, rarely alternate, very often marked with pellucid dots."

Sect. 1. Flowers axillary, either solitary, or on opposite many-flowered stalks. Leaves generally opposite, and dotted. *Alangium* Lamarck, *Dodecas*, *Melaleuca*, fig. 53-56, *Leptospermum*, *Guapurium* Juss., *Psidium*, *Myrtus*, *Eugenia*, *Caryophyllus* (which is an *Eugenia*), *Decumaria*, *Punica*, *Philadelphus*, *Son-*

neratia, *Fœtidia* Commers. Lamarck Illustr. t. 419, *Catinga* Aubl. and *Eucalyptus*, fig. 253, L'Herit. To these are to be added *Calyptranthes* Swartz Ind. Occ. 917, *Bæckea*, to which Mr. Brown refers *Jungia* of Gærtn. t. 35 (*Imbricaria* Sm. Tr. of Linn. Soc. v. 3. 257), *Fabricia* Gærtn., *Memecylon* and *Jambolifera*, as well as Mr. Brown's new genera from Australasia, *Tristania*, *Calothamnus*, *Beaufortia* Ait. H. Kew. v. 4. 418, *Callistemon*, *Eudesmia* Bot. Terr. Austr. t. 3.

Sect. 2. Flowers clustered, alternate. Leaves generally alternate, and not dotted. *Barringtonia* (*Butonica* Juss.), *Stravadium* Juss., *Gustavia*, *Couroupita* Aubl., and *Lecythis*.

The first Section constitutes, for the most part, a very natural family of aromatic and elegant trees or shrubs, in which New Holland is remarkably rich, Mr. Brown having found there considerably above 200 species, nearly 100 of which compose the genus *Eucalyptus*. *Alangium* belongs rather to the 2d Section, and *Dodecas*, as Jussieu suspected, to the *Salicariæ*, Ord. 91.

Ord. 90. MELASTOMÆ. "Calyx of 1 leaf, tubular, superior or inferior, sometimes surrounded by scales at the base. Petals definite, inserted into the top of the Calyx, alternate with it's segments, and equal to them in number. Stamens inserted into the same part, definite, twice as many as the Petals; the apex of each Filament, under the Anther, generally furnished with a pair of bristles, or auricles. Anthers long, beaked at the point, attached by the base to the very top of each Filament, and in an early stage drooping, from the incurvation of the Filament, but afterwards erect" (large and conspicuous). "Germen either superior, closely covered by the Calyx, or inferior. Style 1. Stigma single. Fruit pulpy, or capsular; if superior, concealed by the narrow-mouthed Calyx; if inferior, becoming confluent with the enlarged or pulpy Calyx; of many cells, with many Seeds in each. Albumen wanting? Stem somewhat arboreous or shrubby, more rarely herbaceous. Leaves opposite, simple, with 3 or more longitudinal ribs. Flowers opposite, axillary or terminal, one or many on a Stalk."

Sect. 1. Germen inferior. *Blakea*, fig. 254, *Melastoma*, and *Tristemma* Juss.

Sect. 2. Germen superior. *Topobea*, *Tibouchina*, *Mayeta*, and *Tococa*, all genera of Aublet's, with *Osbeckia* and *Rhexia*.

A very handsome Order, mostly remarkable for the size and beauty of the Anthers. *Osbeckia* has been much increased by the discoveries of Dr. A. Afzelius at Sierra Leone; see Sm. in Rees's Cyclop. v. 25. The 4 or 5 deciduous teeth of the Calyx, accompanied by intermediate scales, best distinguish this genus from *Rhexia*, whose teeth are permanent and simple.

Ord. 91. SALICARIÆ. "Calyx tubular, or pitcher-shaped. Petals definite, inserted into the top of the

Calyx, alternate with it's segments, sometimes wanting. Stamens definite, except in *Lagerstromia* and *Munchausia*, as many, or twice as many, as the Petals, inserted into the middle part of the Calyx. Anthers small. Germen simple, superior. Style 1. Stigma often capitate. Capsule surrounded by the Calyx, of 1 or many cells, with many Seeds, inserted into a central Receptacle. Albumen none. Stem shrubby or herbaceous. Leaves opposite or alternate. Flowers axillary or terminal."

Sect. 1. Flowers with several Petals. *Lagerstromia*, *Munchausia*, *Pemphis*, *Ginoria*, *Grislæa*, *Lawsonia*, *Crenea* Aubl. and *Lythrum*, fig. 255, with *Acisanthera*, *Parsonsia* and *Cuphea* of Browne's Jamaica.

Sect. 2. Flowers often without Petals. *Isnardia*, *Ammannia*, *Glaux*, and *Peplis*, to which *Rotala* is to be added.

Ord. 92. ROSACEÆ. "Calyx either superior and tubular, or inferior, pitcher-shaped, or wheel-shaped, usually permanent; it's limb generally divided. Petals definite, mostly 5, inserted into the top of the Calyx, alternate with it's segments, sometimes wanting. Stamens indefinite, rarely definite, inserted into the same part under the Petals. Anthers often roundish. Germen either simple and inferior, with, for the most part, numerous Styles and Stigmas; or superior, either simple, with 1 Style, or several with as many Styles; the Styles always originating from the side of each Germen. Structure of the Fruit various: in some an Apple, *Pomum* (61 : 5), inferior, and of many cells; or the urn-shaped inferior body of the Calyx is contracted at it's mouth over the numerous Seeds; in some the Seeds, or Pericarps of one cell generally single-seeded, whether indefinite or definite, are superior, being placed on a Common Receptacle; in others the Capsule is solitary, superior, of 1 cell, or the Nut, likewise superior, contains 1 or 2 Seeds, and is either naked, or clothed with a" (more or less) "fleshy coat. Scar of the Seed beneath the summit at one side, connected with a cord arising from the base of the Pericarp. Embryo straight, without any Albumen. Stem herbaceous, shrubby, or arboreous. Leaves alternate, simple, or compound, with Stipulas."

Sect. 1. *Pomaceæ.* Germen single, inferior. Styles several. Apple of several cells, umbilicated with the border of the Calyx. Trees or Shrubs. *Malus, Pyrus,* and *Cydonia* of Tournefort and Jussieu, all included most naturally under *Pyrus* by Linnæus; *Mespilus,* fig. 18, 19, *Cratægus,* and *Sorbus.*

Sect. 2. *Rosæ.* Germens indefinite, in the pitcher-shaped body of the Calyx, each with 1 Style. Seeds as many. Shrubs. *Rosa,* fig. 256, 257.

Sect. 3. *Sanguisorbæ.* Germens definite, rarely single, in the pitcher-shaped body of the Calyx, each with 1 Style. Seeds as many. Stem herbaceous in general; some without Petals, some with definite Stamens, some with separated Flowers. *Poterium, San-*

guisorba, *Ancistrum* Forst., which is the same genus with *Acæna*, *Agrimonia*, *Neurada*, probably more akin, as Jussieu thinks, to the *Ficoideæ*, Ord. 87, *Cliffortia*, *Aphanes*, *Alchemilla* and *Sibbaldia*, fig. 258.

Sect. 4. *Potentillæ*. Germens indefinite, truly superior, on a Common Receptacle, each with 1 Style. Seeds as many, naked, or rarely pulpy. Herbs, rarely shrubby. *Tormentilla*, *Potentilla*, *Fragaria*, fig. 259, *Comarum*, *Geum*, *Dryas* and *Rubus*.

Sect. 5. *Spireæ*. Germens several, definite, superior, each with 1 Style. Capsules as many, with 1 or more Seeds. Shrubs, rarely Herbs. *Spiræa*, fig. 260, *Suriana* and *Tetracera* (see next Section).

Sect. 6. *Prockiæ*. Germen 1, superior, with 1 Style. Fruit of 1 cell, with 1 or many Seeds. Trees or Shrubs, sometimes wanting Petals. *Tigarea* Aubl., and *Delima* (these with *Tetracera*, of which *Tigarea* is a species, belong to DeCandolle's *Dilleniaceæ*, see Ord. 75) *Prockia* and *Hirtella*.

Sect. 7. *Amygdaleæ*. Germen 1, superior, with 1 Style. Nut with 1 or 2 Seeds, naked, or more frequently drupaceous. Trees and Shrubs. *Hedycrea* Schreb. 160 (*Licania* Aubl.), *Grangeria* Commers. Lamarck Illustr. t. 427, *Chrysobalanus*, *Prunus*, fig. 261 (from which Jussieu, like Tournefort, divides *Cerasus* and *Armeniaca*), *Amygdalus*, *Moquilea* Aubl., *Couepia* Aubl., *Acia* Schreb. 458 (*Acioa* Aubl.), and *Petrocarya* Schreb. 245 (*Parinarium* Aubl.).

Sect. 8. Genera allied to *Rosaceæ*. *Plinia*, *Ca-*

lycanthus, *Ludia*, Commers. Lamarck Illustr. t. 466, *Blackwellia* Commers. Lam. t. 412, *Homalium*, and *Napimoga* Aubl. (The three last are probably one genus, to which the name of *Homalium* must belong.)

To the 5th Section of *Rosaceæ* are to be added Prof. DeCandolle's *Kerria* and *Purshia*, Tr. of Linn. Soc. v. 12. 152. The former is that elegant Japanese shrub, commonly called *Corchorus japonicus ;* which is also *Rubus japonicus* of Linnæus. The latter is *Tigarea tridentata*, Pursh N. Amer. 333. t. 15, very distinct from the real *Tigarea*, which is, as above said, a *Tetracera*.

A new Section must, it seems, be made to admit the *Cephalotus* of Labillardiere, Nov. Holl. v. 2. 7. t. 145, so admirably illustrated by Mr. Brown and Mr. Bauer, Bot. of Terra Austr. 68. t. 4. This has a coloured Calyx, in 6 segments, whose æstivation is valvular; no Petals. Twelve Stamens, inserted into the Calyx. Anthers glandular at the back. Six distinct Germens, with terminal Styles, and solitary erect Seeds. The great peculiarity of the herb consists in it's large radical water-pitchers, interspersed among the Leaves, each closed by a lid, as in *Nepenthes*.

Ord. 93. LEGUMINOSÆ, fig. 40-47, and 262, 268. "Calyx of 1 leaf, fig. 43, variously divided. Corolla polypetalous, very rarely monopetalous, or wanting, inserted into the upper part of the Calyx, below it's segments. Petals 5, sometimes fewer, either regular and nearly equal; or more commonly 4, irregular butterfly-shaped, whence the flower in question is termed papilionaceous; the uppermost and exterior Petal being termed the Standard (*Vexillum*, fig. 44), which half embraces the rest, and is in general the largest of all; the 2 lateral ones are called wings (*Alæ*, fig. 45); the lowermost the Keel (*Carina*, fig. 46), which is sometimes divided, or composed of 2 equal Petals. Stamens 10, fig. 40-42, rarely fewer or more, inserted into the Calyx beneath the Petals, their Filaments either quite distinct, fig. 262, or combined slightly at the very base only, or more frequently diadelphous, fig. 263, 9 of them being united into a tube, cloven lengthwise under the Standard, to whose fissure the tenth is closely applied; or sometimes the 10 are all united into 1 undivided tube, so as to be really monadelphous, fig. 41. Anthers distinct, generally roundish and small; sometimes oblong and incumbent. Germen, fig. 47, simple, superior" (often stalked). "Style 1. Stigma 1. Fruit in a few instances capsular, of 1 cell, and generally 1 Seed, either of 2 valves, or none at all; in the greater number leguminous, whence the name of the Order, elongated, of 2 valves, of 3 in *Moringa*, and of 4 in a few of the *Mimosa* tribe" (*Schrankia*, Willd. Sp. Pl. v. 4. 1041); "sometimes of 1 cell, with 1 or more Seeds; sometimes of many cells, divided by transverse partitions, the single-seeded cells being occasionally pulpy. The Seeds are inserted into one of the lateral sutures. In those with polypetalous irregular Flowers, the Radicle is bent over the Cotyledons, without any separate Albumen; in those with regular ones, the Embryo is enfolded in a thickish membranous Albumen, and the Radicle is straight. The Cotyledons usually rise in the form of seminal leaves, like the generality of dicotyledonous plants; sometimes they remain below, distinct from the first Leaves. Stem herbaceous, shrubby, or arboreous, for the most part alternately branched. Leaves with Stipulas, alternate, in a very few imperfectly opposite, sometimes simple, more generally ternate, or digitate, or once or repeatedly pinnate. Inflorescence various."

Such are the marks of this great natural Order, which has no relationship at all to the last, in characters or properties, as far as I can perceive, though Jussieu hints at an affinity between those with regular Flowers, and some of the monogynous *Rosaceæ*. The difficulties attending the papilionaceous tribe, with respect to their being referred to the Linnæan class *Diadelphia*, have already been explained, p. 48. Jussieu's Sections labour under the very same exceptions.

Sect. 1. Corolla regular. Legume generally bivalve, of many single-seeded cells, with transverse partitions. Stamens distinct. Trees or Shrubs, with abruptly-pinnate Leaves. *Mimosa* (now subdivided by Willdenow), *Gleditsia*, *Gymnocladus* Lamarck, Schreb. 696, *Macrolobium* Schreb. 30 (*Outea* Aubl.), *Ceratonia*, *Tamarindus*, *Parkinsonia*, *Schotia* Jacq., and *Cassia*.

Sect. 2. Cor. regular. Legume of 1 cell and 2 valves. Stam. 10, distinct. Trees or Shrubs, with abruptly pinnate Leaves, except the first genus. *Moringa* Schreb. 741, *Prosopis*, *Hæmatoxylum*, *Dimorpha* Schreb. 493 (*Eperua* Aubl.), *Cubæa* Schreb. 278 (*Tachigalia* Aubl.), *Adenanthera*, *Poinciana*, *Cæsalpinia* and *Guilandina*.

Sect. 3. Cor. slightly irregular. Stamens distinct, or only connected at the bottom. Legume of 1 cell and 2 valves. Trees or Shrubs, with abruptly-pinnate Leaves, sometimes only either conjugate, or simple. *Dipteryx* Schreb. 485 (*Taralea* Aubl.), *Dimorpha* Schreb. 493 (*Parivoa* Aubl.), *Vouapa* Aubl. (united with *Outea* by Schreber, under his *Macrolobium*, see Sect. 1.), *Cynometra*, *Hymenæa*, *Bauhinia*, and *Gi-nannia* Schreb. 271 (*Palovea* Aubl.).

Sect. 4. Cor. irregular, papilionaceous (sometimes incomplete). Stam. distinct, or rarely combined at the base. Legume of 1 cell and 2 valves. Trees or Shrubs. Leaves simple, or ternate, or pinnate with an odd leaflet. *Cercis*, *Rittera* Schreb. 364 (*Possira* Aubl.), *Anagyris*, *Sophora*, *Mullera*, and *Coublandia* Aubl. This Section has received a great addition of new genera, not only by the unavoidable subdivision of *Sophora*, from which *Edwardsia*, *Ormosia*, *Thermopsis* Br., *Virgilia* Lamarck, *Cyclopia* and *Baptisia* Ventenat, and *Podalyria* Lamarck, have been taken; but still more by the discovery of many, previously entirely undescribed, in New Holland. Of these *Pultenæa*, *Aotus*, *Gompholobium*, *Chorizema* Labill., *Da-*

viesia, *Viminaria*, fig. 262, *Sphærolobium*, *Dillwynia*, and *Mirbelia* (the last having a Legume divided lengthwise, by the inflexion of it's valves), were first defined in Sims and Kon. Ann. of Bot. v. 1. Mr. Brown has added the following, in Ait. Hort. Kew. ed. 2. v. 3. *Podolobium*, *Oxylobium*, *Brachysema*, *Burtonia*, *Jacksonia*, *Eutaxia*, *Sclerothamnus*, *Gastrolobium*, and *Euchilus*.

Sect. 5. Cor. papilionaceous. Stam. 10, diadelphous (more or less correctly, as already mentioned). Legume of 1 cell and 2 valves. Shrubs or Herbs. With simple or ternate, rarely digitate, sometimes pinnate, Leaves. Stipulas more or less evident, united or not to each Footstalk. *Ulex*, fig. 41, *Aspalathus*, *Borbonia*, *Liparia*, *Genista* (including *Spartium*, fig. 40), *Cytisus*, *Crotalaria*, *Lupinus*, *Ononis*, *Arachis*, *Anthyllis*, *Dalea*, *Psoralea*, *Trifolium*, *Melilotus* Tourn., *Medicago*, *Trigonella*, *Lotus*, *Dolichos*, *Phaseolus*, *Erythrina*, *Clitoria*, and *Glycine*. This Section has also received additions from New Holland, *Platylobium*, *Bossiæa*, *Hovea* Br., *Callistachya* Venten., *Scottia* Br., *Templetonia* Br., *Kennedia* Venten., *Goodia* Salisb., and *Loddigesia* Sims; as well as from the Cape of Good Hope, *Lebeckia*, *Wiborgia*, *Oedmannia*, *Rafnia*, *Hypocalyptus*, *Sarcophyllus*, and *Hallia* Thunb.; also from the East Indies *Butea* and *Flemingia* of Roxburgh.

Sect. 6. Cor. Stam. and Legume as the last. Herbs, Shrubs, or Trees. Leaves pinnate with an odd one.

(*Astragalus* and *Biserrula* have a Legume of 2 cells.) —*Abrus*, *Amorpha*, *Piscidia*, *Robinia*, *Caragana* Van Royen, *Astragalus*, fig. 263, *Biserrula*, *Phaca*, *Colutea*, *Glycyrrhiza*, *Galega*, and *Indigofera*.—To these *Swainsonia* Salisb., *Sutherlandia* Br., and *Lessertia* DeCand. may be added.

Sect. 7. Cor. Stam. and Legume as the last. Herbs. Leaves pinnate, or conjugate, rarely obliterated; their common Footstalk ending in a Tendril or Bristle. Stipulas distinct from that Stalk. *Lathyrus*, *Pisum*, fig. 42-47, *Orobus*, *Vicia*, *Faba* Tourn., *Ervum* and *Cicer*.

Sect. 8. Cor. and Stam. the same. Legume of single-seeded joints. Herbs or Shrubs, rarely Trees. Leaves simple or ternate, or more frequently pinnate with an odd one. Stipulas distinct from the Footstalk. *Scorpiurus*, *Ornithopus*, *Hippocrepis*, *Coronilla*, *Hedysarum*, *Aeschynomene*, with *Diphysa* Jacq., to which may be added *Smithia*, Dryand. in Ait. Hort. Kew.

Sect. 9. Cor. the same. Stam. mostly 10, diadelphous. Legume capsular, often not bursting, of 1 cell, and usually 1 Seed. Trees or Shrubs. Leaves generally pinnate with an odd leaflet. Stipulas distinct from the Footstalk, soon deciduous. *Dalbergia*, *Amerimnon* Browne, *Galedupa* Lamarck (*Pungamia* Lam. Illustr. t. 603), *Andira* Lam., *Geoffroea*, *Deguelia* Aubl., *Nissolia*, *Dipteryx* Schreb. 485 (*Coumarouna* Aubl.), *Acouroa* Aubl., and *Pterocarpus*.

Sect. 10. Cor. irregular, sometimes wanting. Stam. 10, distinct. Legume capsular, generally not bursting, of 1 cell, and mostly 1 Seed. Trees or Shrubs. Leaves either pinnate with an odd one, or simple. Stipulas like the last. *Crudia* Schreb. 282 (*Apalatoa* Aubl.), *Detarium* Juss., *Copaifera* and *Myroxylum* (*Myrospermum* Jacq.).

Sect. 11. Four Genera akin to *Leguminosæ*. *Securidaca*, which might be removed to the 9th, and *Brownea* to the 2nd Section. *Zygia* Browne, an obscure plant of the *Mimosa* family, and *Aruna* Schreb. 26 (*Arouna* Aubl.).

Mr. Brown has well divided the *Leguminosæ* into 3 Orders, *Mimoseæ*, *Lomentaceæ*, and *Papilionaceæ*. Bot. of Terra Austr. 19.

Ord. 94. TEREBINTACEÆ. "Calyx of 1 leaf, inferior, in a definite number of segments. Petals definite, rarely wanting, inserted into the bottom of the Calyx, as many as it's segments, and alternate therewith. Stamens as many, alternate with the Petals, or twice as many, inserted into the same spot. Germens either single, or of a determinate number: in the former case there is either 1 Style, rarely wanting, with a simple or divided Stigma; or many Styles with as many Stigmas; and a capsular, sometimes pulpy, or drupaceous, Fruit, of one or many single-seeded cells: in those with several Germens, there are as many single Styles and Stigmas; with the same number of distinct single-seeded Capsules. Seeds generally lodged in a bony Nut. Albumen none. Radicle lateral, reflexed upon the Cotyledons. Stem arboreous or shrubby. Leaves alternate, without Stipulas, either simple, or ternate, or pinnate with an odd leaflet."

Sect. 1. Germen 1. Fruit of 1 cell, with 1 Seed. *Anacardium* (*Cassuvium* Rumph. and Juss.), *Semecarpus*, fig. 264 (*Anacardium* Juss.), *Mangifera*, *Connarus*, *Rhus*, and *Robergia* Schreb. 309 (*Rourea* Aubl.).

Sect. 2. Germen 1. Fruit of many cells, some of which are sometimes abortive. *Cneorum*, *Rumphia*, *Comocladia*, *Canarium*, *Icica* Aubl., *Amyris*, *Scopolia* Sm., *Schinus*, *Spathelia*, *Pistacia* (*Terebinthus* Tourn. and Juss.), *Bursera*, *Toluifera*, *Jonquetia* Schreb. (*Tapiria* Aubl.), *Poupartia* Commers. (*Mangifera pinnata* Linn. Suppl. 156.), and *Spondias*.

Sect. 3. Germens several. Fruit of several single-seeded Capsules. *Zwingera* Schreb. 802 (*Simaba* Aubl.), *Aylanthus* Desfont., and *Brucea*.

Sect. 4. Genera akin to *Terebintaceæ*, differing in having a fleshy Albumen, which approaches them to the *Rhamni*. *Cnestis* Juss. Lam. Illustr. t. 387.; *Fagara* and *Xanthoxylum* (genuine *Rutaceæ*, see Ord. 81.); and *Ptelea*.

Sect. 5. Genera akin to *Terebintaceæ*, destitute of a fleshy Albumen. *Dodonæa*, *Averrhoa*, *Juglans* (all surely very remotely allied to this order, or to each other!).

Ord. 95. RHAMNI. " Calyx inferior, of one leaf, definitely divided at the border. Petals 5, rarely 4 or 6, very rarely wanting, inserted either into the upper part of the Calyx, or into it's disk, alternate with the segments and equal to them in number, sometimes resembling scales, and furnished with claws, sometimes dilated and joined at the base. Stamens as many, inserted into the same part, either alternate with, or opposite to, the Petals. Germen superior, encompassed with the glandular disk of the Calyx. Style 1, or several. Stigma 1 or more. Fruit either pulpy, of many cells, or with many Nuts, each cell or Nut containing 1 Seed; or capsular, of many cells and many valves, with central partitions, each cell having 1 or 2 Seeds. Embryo flat and straight, lodged in a fleshy Albumen. Stem arboreous or shrubby. Leaves alternate or opposite, with, often very minute, Stipulas."

Sect. 1. Stamens alternate with the Petals. Fruit capsular. *Staphylea, Euonymus,* fig. 265, *Polycardia* Juss. Lam. Illustr. t. 132, and *Celastrus.*

Sect. 2. Stam. as above. Fruit pulpy. *Myginda, Glossopetalum* Schr. 205 (*Goupia* Aubl.), *Rubentia* Commers., *Cassine, Ilex* and *Prinos.* (*Schrebera* of Linnæus, placed here, is an error, the plant described being a *Cuscuta* on a *Myrica*!)

The greater part of these 2 Sections composes Mr. Brown's new Order of *Celastrinæ,* Bot. of Terra

Austr. 22. The Aestivation of their Calyx is imbricated. Seeds tunicated.

Sect. 3. Stam. opposite to the Petals. Fruit drupaceous. *Mayepea* Aubl., *Samara*, *Rhamnus*, fig. 266, *Ziziphus*, and *Paliurus*.

Sect. 4. Stam. the same. Fruit 3-lobed. *Colletia* Commers. Lam. Illustr. t. 129, *Ceanothus*, *Hovenia* Thunb., and *Phylica*.

These 2 last Sections chiefly contain Mr. Brown's true *Rhamneæ*, the Aestivation of whose Calyx is valvular, and it's tube coheres more or less with the Germen. He admits here *Rhamnus*, *Ziziphus*, *Paliurus*, *Ceanothus*, (from which last, as he justly says, *Pomaderris* is hardly distinct,) *Colletia*, *Cryptandra* Sm., *Phylica*, *Gouania*, *Ventilago* Gærtn., and probably *Hovenia*.

Another Order of Mr. Brown's, named *Buttneriaceæ*, Bot. of Terra Austr. 8, is allied on one hand to *Rhamneæ*; on the other to *Malvaceæ*. To this belong *Abroma*, *Commersonia*, *Lasiopetalum*, fig. 267, and several unpublished genera.

Sect. 5. Akin to *Rhamni*, generally with a superior Germen. *Brunia*, and Thunberg's *Bumalda*.

Sect. 6. Akin to *Rhamni*, but differing in their inferior Germen. *Gouania*, see Sect. 4, *Plectronia*, *Carpodetus* Forst., *Aucuba* Thunb., *Glossoma* Schreb. 792 (*Votomita* Aubl.).

CLASS 15. DICOTYLEDONES, WITHOUT PETALS. STAMENS SEPARATED; that is, in a different Flower from the Pistils.

"*Flowers either monoecious* (65) *or dioecious, or very rarely united. Calyx in each of one leaf, or a scale in it's stead. Corolla none, but sometimes there are scales, or inner segments of the Calyx, assuming the appearance of Petals. The Barren Flowers have Stamens inserted into some part of the Calyx, or of the Scale supplying it's place, definite, or more rarely indefinite, their Filaments either distinct, or sometimes united into a stalk proceeding from the centre of the Calyx. Germen of the Fertile ones simple, or sometimes several, superior, or rarely inferior. Style* 1, *or more, or occasionally wanting. Stigma simple or divided. Fruit various in structure, as well as in the number of it's cells.*"

Ord. 96. EUPHORBIÆ. "Flowers monoecious or dioecious, rarely united. Calyx of each tubular, or deeply divided, single or double, the inner segments sometimes assuming the aspect of Petals, nor are there any other. Barren Flowers with Stamens definite or indefinite, their Filaments inserted into the centre of the Calyx, separate or combined, sometimes branched, sometimes jointed. In some instances there are chaffy scales interspersed between the Stamens. Fertile Flowers with 1 Germen, which is superior, either sessile or stalked. Some have several Styles, often 3, and a Capsule with as many cells, with 1 or 2 Seeds in each: others have only 1 Style, with 3 or more Stigmas, and a Fruit of a corresponding number of cells, each containing 1 or 2 Seeds. The cells are each lined with 2 elastic valves; the Seeds half-tunicated, attached to the upper part of a permanent central column. Embryo flat, inclosed in a fleshy Albumen. Plants herbaceous, shrubby, or arboreous; some milky. Leaves alternate or opposite, rarely wanting, either with or without Stipulas."

Sect. 1. Styles several, definite, usually 3. *Mercurialis*, *Euphorbia*, fig. 268, *Argythamnia* Browne, *Cicca*, *Phyllanthus*, *Xylophylla*, *Kirganelia* Juss., *Kiggelaria*, *Cluytia*, *Andrachne*, *Agyneia*, *Buxus*, fig. 269, *Securinega* Commers., *Adelia*, *Mabea* Aubl., *Ricinus*, *Jatropha*, *Siphonia* Schreb. 656 (*Hevea* Aubl.), *Aleurites* (including *Dryandra* of Thunberg), *Croton*, *Acalypha*, *Caturus*, and *Excoecaria*.

Sect. 2. Style solitary. *Tragia*, *Stillingia*, *Sapium* Browne, *Hippomane*, *Aegopricon* (*Maprounea* Aubl.), *Sechium* Browne, *Hura*, *Omphalea*, *Plukenetia* (which has certainly Stipulas), and *Dalechampia*.

Jussieu has hinted an ingenious idea respecting the genus *Euphorbia*, which Mr. Brown, Bot. of Terra Austr. 24, has fully developed, that the Flowers, even in this instance, are monoecious. The Calyx and Petals of Linnæus are considered by these writers as an Involucrum, containing several Barren Flowers, around a solitary fertile one. But Mr. Brown alone has asserted each of the former to consist of a mere Stamen, articulated with the partial Stalk of this simplest of all Flowers, there being no Corolla nor Perianth, the Scales at the base being rather of the nature of Bracteas. The Fertile Flower in the centre is, in like manner, a naked Pistil, whose Germen is sessile on a similar Stalk. If conviction were wanting, this opinion is proved by an unpublished genus, whose several Flowers have each a lobed Perianth at the articulation above mentioned.

Ord. 97. CUCURBITACEÆ. "Flowers monoecious, rarely dioecious, or still more rarely, in *Gronovia* and *Melothria*, united. Calyx (Corolla *Tourn.* and *Linn.*) superior, contracted just above the Germen, then dilated, five-cleft, often coloured, withering, slow in falling, furnished externally at the base with 5 green appendages (Calyx *Tourn.* and *Linn.*) resembling outer segments of the Calyx, and falling with it. Corolla" (according to Jussieu) "none. Barren Flowers with usually five, sometimes distinct, and sometimes variously combined, Filaments and Anthers; the former inserted into the contracted part of the Calyx; the latter of 1 cell, oblong, attached to the tops of the Filaments, and often forming a doubly curved line, 4 of them being combined in pairs, the fifth solitary. There is an imperfect or abortive Germen. Fertile Flowers with imperfect Stamens, or none at all. Germen inferior. Style 1, rarely more.

Stigmas generally several. Fruit a Berry, with usually a solid coat, of 1 cell, with 1 or numerous Seeds, or of several many-seeded cells. Seeds cartilaginous or crustaceous, inserted into lateral, or cortical, Receptacles. Embryo flat, without Albumen. Root mostly tuberous. Stem herbaceous, trailing, or climbing. Leaves alternate, simple, heartshaped or palmate, rarely digitate" (or very deeply lobed), "often harsh with callous points. Tendrils axillary. Flowerstalks axillary, simple or many-flowered."

Sect. 1. Style 1. Fruit of 1 cell, single-seeded. *Gronovia* and *Sicyos.*

Sect. 2. Style 1. Fr. of 1 cell, with many Seeds. *Bryonia*, fig. 270, and *Elaterium.*

Sect. 3. Style 1. Fr. of many cells, with many Seeds. *Melothria*, *Anguria*, *Momordica*, *Cucumis*, *Cucurbita*, *Trichosanthes*, and *Ceratosanthes* Burm.

Sect. 4. Styles several. Doubtful *Cucurbitaceæ.* *Feuillea* and *Zanonia.*

Sect. 5. Genera akin to *Cucurbitaceæ*, but especially different in having a superior Germen. *Passiflora*, fig. 271, from which Jussieu separates, surely without sufficient grounds, *Murucuia* and *Tacsonia*; (the latter distinguished by it's tubular Calyx, which serves at least to show that this Order has a real Calyx and Corolla,) and *Carica* (*Papaya* Juss.).

The *Modecca* (a barbarous name) of Rheede Hort. Malab. v. 8. t. 20-23, mentioned by Jussieu under

Passiflora, is doubtless a very distinct genus, with a coloured, bell-shaped Calyx, and fringed, deeply 5-cleft, Corolla. I would call it *Blepharanthes*, to preserve an analogy with *Trichosanthes*. A species of this genus, brought by Dr. Afzelius from Sierra Leone, flowered, many years since, in Sir Abraham Hume's stove, and I believe is still growing there. *Zucca* of Commerson likewise appears to be a distinct genus, which cannot be settled for want of the Fruit.

Ord. 98. URTICÆ. "Flowers monoecious or dioecious, rarely united. Calyx, in every instance, of 1 leaf, divided. Corolla none. Barren Flowers with definite Stamens, inserted into the lower part of the Calyx, opposite to it's segments. Fertile Flowers with a single superior Germen. Style either wanting, or 1 or 2, often lateral. Stigmas often 2. Seed 1, inclosed either in a brittle crust, or a tunic, either naked, or covered with the sometimes pulpy Calyx. Embryo straight or incurved, destitute of Albumen. Trees, Shrubs, or Herbs, sometimes milky. Leaves alternate or opposite, generally with Stipulas. Flowers either solitary, racemose, or assembled many together on a catkin-like Receptacle, or concealed more or less in a single-leaved common Involucrum. Fruit sometimes many-seeded, from the assemblage of numerous Seeds in one aggregate, or confluent, Involucrum or Receptacle."

Sect. 1. Flowers concealed in a Common Involucrum, of 1 leaf. *Ficus,* fig. 92-95, *Mithridatea* Schreb. 783 (*Ambora* Juss.), *Dorstenia,* fig. 272, *Hedycaria* Forst. and *Perebea* Aubl.

Sect. 2. Flowers either on a many-flowered common Receptacle, or capitate and accompanied by involucral scales, or distinct and scattered. *Cecropia, Artocarpus, Morus, Elatostema* Forst., *Boehmeria* Jacq. (*Caturus* Linn.), *Procris* Commers. Lam. Illustr. t. 763, *Urtica,* fig. 273, *Forskalea, Parietaria, Pteranthus* Forsk. (*Louichea* Schreb. 840.), *Humulus,* fig. 274, *Cannabis,* and *Thelygonum.* To these are to be added *Brosimum,* Swartz Ind. Occ. 15. t. 1, *Antiaris,* Br. Bot. of Terra Austr. 70. t. 5, and *Olmedia,* Fl. Peruv. 118.

Sect. 3. Genera allied to *Urticæ. Gunnera, Misandra* Commers. perhaps the same genus, *Piper, Gnetum* (including *Thoa,* see Sm. in Rees's Cycl. v. 16), *Bagassa* Aubl., *Coussapoa* Aubl., and *Pourouma* Aubl., the 3 last very imperfectly known.

Ord. 99. AMENTACEÆ. "Flowers monoecious or dioecious, rarely united, all destitute of Petals. Barren ones disposed in a Catkin, furnished with scales, which, if there be no other Calyx, bear the Stamens; or, otherwise, are each accompanied by a single-leaved Calyx, fig. 89, into which the Stamens are inserted. Stamens definite or indefinite, with distinct Filaments. Fertile Flowers either in Catkins, or fasciculated, or solitary, each furnished either with a single-leaved Calyx, fig. 82-84, or only with a scale. Germen superior, fig. 83, 84, 91, either single, or more rarely several, in a definite number. Style 1, fig. 83, or more. Stigmas often several, fig. 91. Seeds either naked, or inclosed in as many Capsules as there are Germens, each mostly of 1 cell, sometimes coriaceous, sometimes bony. Embryo without Albumen; the Radicle straight. Stem arboreous, or shrubby, seldom of humble stature, fig. 84-87. Leaves, fig. 80, 85, 87, alternate, with Stipulas, mostly simple."

Sect. 1. Flowers (imperfectly) united. *Fothergilla*, *Ulmus*, and *Celtis*.

Sect. 2. Fl. dioecious. *Salix*, fig. 85-87, *Populus*, fig. 88-91, and *Myrica*.

Sect. 3. Fl. monoecious. *Betula*, *Alnus*, Comp. Fl. Brit. 133, *Carpinus*, *Fagus*, *Quercus*, fig. 80-84, *Corylus*, *Liquidambar*, *Comptonia* Schreb. 811, and *Platanus*.

Between this Order and the following may be introduced the *Casuarineæ*, founded by Mirbel, and adopted by Mr. Brown, Bot. of Terra Austr. 39, solely for the New Holland genus *Casuarina*.

Ord. 100. CONIFERÆ. "Flowers monoecious or dioecious. Barren ones mostly amentaceous, or collected into a Catkin, each furnished with a Scale, and sometimes also a Calyx, either the Calyx or the Scale bearing the Stamens, which are either definite or indefinite; their Filaments either distinct, or united into a simple or branched stalk. Fertile Flowers either solitary, or capitate, or disposed in a Cone, *Strobilus*

(61:7), formed of densely imbricated scales separating the Flowers, and each performing the office of a Calyx. Germen superior, conical, sometimes 2 or more, with as many Styles and Stigmas. Seeds, or single-seeded Capsules, as many as the Germens. Embryo cylindrical, in the centre of a fleshy Albumen, the 2 Cotyledons either undivided, or sometimes cloven, as if palmate, into numerous segments, appearing, in *Pinus*, as if there were many distinct Cotyledons (89). Stem arboreous or shrubby."

Sect. 1. Calyx bearing the Stamens. *Ephedra*, *Casuarina* (see above), and *Taxus*, fig. 275.

Sect. 2. Calyx wanting. Scales bearing the Stamens. True *Coniferæ*. *Juniperus*, *Cupressus*, *Thuya*, *Dombeya* Schreb. 704 (*Araucaria* Juss.), *Pinus*, fig. 276, and *Abies* (the last including *Abies* and *Larix* of Tournefort).

To these are to be added *Agathis*, Salisb. Tr. of Linn. Soc. v. 8. 311, *Podocarpus* L'Herit., *Dacrydium* Soland. fig. 277, and *Callitris* Venten. Dec. Gen. Nov. 10.

The structure of the Pistil of *Coniferæ*, long misunderstood, has been explained by Mirbel, Schoubert, and Brown. These writers describe a covering, termed by them *Cupula*, but which Linnæus would probably have called *Nectarium*, closely investing the Germen, and, in most cases, the Stigma also. This becoming pulpy, forms the red half-drupa of *Taxus*; and is double in *Podocarpus* and *Dacrydium*, according to Mr. Brown, as well as remarkably inverted, having the aperture near the base. The outermost of these coverings is probably a real Calyx, as appears by the figure of *Dacrydium* in Lambert's *Pinus*, t. 41.

The above general view of this celebrated System will be sufficient for any attentive student to enable him to apply it to practice, and even to correct it, or to make additions, by means of new discoveries. The *Plantæ incertæ sedis*, or Genera which the author could not, at the time he published his work, reduce to any of his Orders, are artificially classed, at the end, by their Petals, situation of the Germen, and number of the Styles and Stamens. These genera amount to 137; but many of them have since been better understood by the author himself, or have been elucidated by others; and several will be found, in the foregoing exposition, either referred to other genera, previously known, or classed with some of their allies. The observations of the distinguished Gærtner, on Fruits and Seeds, in his well-known work on that subject, have conduced greatly to the improvement of Jussieu's system, both in principle and detail; and it's illustrious author has profited by those observations, in several treatises upon different Orders or families, in the *Annales du Museum d'Hist. Nat.*, some of which have been translated by Mr. Konig, in the Annals of Botany. To have undertaken to digest all these improvements, and to have attempted to elucidate them by all that has been done by others, as Ventenat, Salisbury, Link, and especially by Mr. Brown and Prof. DeCandolle, would have been quite beyond the scope of the present publication. Such a task indeed could be undertaken by Jussieu himself alone, who has now for 30 years bent all his attention to the subject, with a view to a new edition of his immortal work, but has not been able to complete his scheme.

Meanwhile DeCandolle, in his *Théorie Elémentaire de la Botanique*, published in 1813, p. 213, has proposed a sketch of Jussieu's System, with many of the above additions, insomuch that the original 100 Orders are here augmented to 145. The series in which they are disposed by their Cotyledons is given, as avowedly artificial. The terminations of the names of the Orders, which are French, are according to the more recent plan of Jussieu and his followers. For instance, Convolvulacées, *Convolvulaceæ*, and Cistinées, *Cistineæ*, instead of *Convolvuli* and *Cisti*. But as this scheme of nomenclature is scarcely yet settled, and may again be altered, I have rather chosen to retain the original terminations, till Jussieu, by a new edition, has established one or the other, according to an uniform plan.

The question of the natural or artificial character of Jussieu's System has been ably discussed by the celebrated Mr. Roscoe, in Tr. of Linn. Soc. v. 11. 65, who, in showing that this method involves several as unnatural assemblages as the professedly artificial system of Linnæus, contends, 'that little is to be gained by it's adoption, with respect to a conformity to nature. Every one must also perceive, that no use can be made of any such system, in the practical or analytical examination of plants. Natural Orders indeed must, in future, be studied by all who deeply contemplate the Vegetable Kingdom, and some links of connexion, or points of discrimination, cannot but be kept in view between them. We require a cabinet, as it were, with cells or drawers, where we may find each Order as we want it; and Jussieu's classification, with all it's unavoidable imperfections, goes much beyond any system previously invented, in the natural assemblages which it produces. Nevertheless, Linnæus has truly observed that Natural Orders are related to each other by so many points, that they rather resemble a geographical map, than a continued series; which he has attempted to illustrate by example, in his *Prælectiones* published by Giseke. There remains therefore, in the study of natural classification, only a choice of difficulties; and while we labour to bring plants together, as naturally as possible, in groups or families, for their mutual illustration, we must perpetually relax or vary those general ties, of which we can, as yet, obtain but very confined and imperfect views. Hence therefore I am almost inclined to revert to the idea of Linnæus, that we are not competent to define technically any natural orders, without so many, and such paradoxical, exceptions, as to destroy all consistency. The labours of his successors too often illustrate and confirm this opinion, by their failure in the details of the subject. The learned and candid DeCandolle, (who first has claimed, from the botanists of his own school, the honours due to Linnæus, relative to the principles of natural arrangement, *Théorie Elém.* p. 60 &c.,) though he has successfully defined several Orders, is obliged to have recourse to an artificial distribution of them, which I have mentioned above, and to which the following is the key.

Class 1. Dicotyledonous. Corolla polypetalous, hypogynous.
2. ——— ——— perigynous.
3. ——— Corolla monopetalous, perigynous.
4. ——— ——— hypogynous.
5. ——— Flowers apetalous, or with one integument only.
6. Monocotyledonous. Flowers phænogamous.
7. ——— ——— cryptogamous.
8. Acotyledonous. Leafy, and with Organs of impregnation.
9. ——— Without leaves, or any known Organs of impregnation.

The able author proposes this method, as less at variance, than any other, with natural affinities, but still as serving merely for convenience, nor does he attach to it any further importance.

The *Genera Plantarum* of Jussieu, with all his characters and remarks, have been translated into French by Ventenat, who has interspersed several additional observations. His work makes four octavo volumes, the first containing a dictionary of Botany. The last, besides a general analytical table, is enriched with plates of the fructification of every one of Jussieu's Orders, drawn by the masterly hand of Redouté. For such a purpose, however, the very best figures are hardly sufficient. Nothing is so instructive as Nature herself; and the student who has made sufficient progress in Botany to understand the foregoing explanations of Jussieu's System, will be at no loss to procure examples, of the greater part of his Orders at least, by the dissection and comparison of whose structure he will gradually become familiarized with the subject, though it's details are inexhaustible.

CHAPTER IX.

COMPARISON OF THE NATURAL ORDERS OF LINNÆUS WITH THOSE OF JUSSIEU.

THE present publication would be incomplete without some account of the Fragments of a Natural Method, as Linnæus terms his performance, subjoined by this great botanist to the 6th edition of his *Genera Plantarum*, an ample commentary upon which, collected partly from his lectures on this particular subject, was published at Hamburgh in 1792, by Prof. Giseke, under the title of *Prælectiones in Ordines Naturales Plantarum.*

An exposition of these Linnæan Orders, which amount to 58, is before the publick in the 2d volume of the Supplement to the *Encyclopædia Britannica*, published at Edinburgh, in which I have extracted what appeared to me most valuable in the above *Prælectiones*, interspersing some very curious particulars, from unpublished notes of Linnæus, in my possession, with a few original remarks: I have also taken a brief comparative view of Jussieu's system at the end. Having in the present volume more fully explained the latter, I shall here reverse the mode of comparison, and place some of the remarks and illustrations in a different light, with a few additional matters.

The name of each Linnæan Order is, in the following table, placed first, and where no particular explanation is necessary, or there is no very material disagreement, the generally corresponding one of Jussieu is merely named; with it's appropriate number, to enable the reader to turn to each Order in it's proper place.

1. PALMÆ—*Palmæ Juss.* Ord. 11.

Linnæus proposed latterly to remove from hence *Cycas* and *Zamia*, which he, like Jussieu, considered as *Filices*, but which Persoon, and Brown, Prodr. N. Holl. v. 1. 346, have more properly disposed in a new Order, called *Cycadeæ*. Linnæus also meant to take away the section β, in which the Fruit is inferior and many-seeded, and which consists of *Stratiotes*, *Hydrocharis* and *Vallisneria*. See Jussieu's *Hydrocharides*, Ord. 22.

2. PIPERITÆ—*Aroideæ* 7.

Piper only is referred by Jussieu to his *Urticæ* 98; and *Saururus* to *Naïades* 6.

3. CALAMARIÆ—*Cyperoideæ* 9.

Sparganium and *Typha*, subsequently removed from hence to his *Piperitæ* by Linnæus, as akin to *Zostera*, make by themselves Jussieu's *Typhæ* 8.

4. GRAMINA—*Gramineæ* 10.

About the plants of this Order, the true Grasses, only one opinion can exist.

5. TRIPETALOIDEÆ—*Junci* 13.

Calamus is properly considered by Jussieu as one of the *Palmæ*, Ord. 1.

6. ENSATÆ—*Irides* 18, with some of the *Junci* 13, and their allies.

7. ORCHIDEÆ—*Orchideæ* 21.

Linnæus's manuscript indicates *Kæmpferia* as betraying an affinity to this Order in the next, but it is chiefly in general aspect.

8. SCITAMINEÆ—*Cannæ* 20.

9. SPATHACEÆ—*Narcissi* 17, except *Allium*, referred by Jussieu to his 16th Order, and *Colchicum*, to his 13th.

10. CORONARIÆ—*Asphodeli* 16, some *Lilia* 14, *Bromeliæ* 15, with some of the *Narcissi* 17, and of the *Junci* 13.

11. SARMENTACEÆ—A few of the *Lilia* 14, begin this Order, but it chiefly consists of the *Asparagi* 12, with the *Menisperma* 77, and *Aristolochiæ* 23. *Centella* is to be erased, as not distinct from *Hydrocotyle*.

Linnæus, in his manuscript notes, justly observes, that part of this Order is monocotyledonous, part dicotyledonous. He adverts also to *Nymphæa*, as having, in like manner, even some species with one, others with two, Cotyledons. This is a mistake into which Gærtner and Jussieu have likewise fallen. See the foregoing exposition of Jussieu's system, Ord. 22 and 62. It appears from Giseke's publication, pref. 20, that Linnæus kept from his pupils his ideas respecting *Nymphæa*, not having, perhaps, satisfied his own mind. He seems to have thought the existence of such a difference in the Cotyledons of one genus, might well justify him in not dividing an Order on that account, and possibly cherished this idea, as an irrefragable proof of his position, that no character whatever was free from exception in natural orders, Neither the deduction, nor the fact as to *Nymphæa*, is now admitted, and yet the *Lentibulariæ* of Brown, see (Ord. 34) p. 96, and *Cuscuta*, see *Convolvuli*, are strong exceptions.

12. HOLERACEÆ—A large Order, of which the 1st section is composed of many of Jussieu's *Atriplices* 29; the 2d of more of the same, with *Calligonum*, one of his *Polygoneæ* 28; the 3d of *Axyris* only, one of his *Atriplices*; the 4th of some *Amaranthi* 30, and some *Atriplices*; the 5th of *Polygoneæ* 28, with *Begonia* their ally in habit, see a remark on Jussieu's 52d Order; the 6th of *Nyssa*, *Mimusops*, *Rhizophora* and *Bucida*; the 7th of *Anacardium* (removed by a manuscript note from the 6th section), *Laurus*, *Tinus*, *Winterania* and *Heisteria*. There is no analogy between these two latter sections and any of Jussieu's Orders. His *Lauri* 27, a good Order, was not perceived by Linnæus.

13. SUCCULENTÆ—*Cactus*, one of Jussieu's 85th Order, with some of his *Portulaceæ* 86, and *Ficoideæ* 87, make the 1st section; *Sempervivæ* 83 are the 2d; some more *Portulaceæ* chiefly compose the 3d; and *Saxifragæ* 84 are the 4th section of this Order, in which Linnæus was guided by habit, and

Jussieu, tracing nearly the same affinities, was much embarrassed for technical characters.

14. GRUINALES—*Gerania* 73, and some of the first section of *Rutaceæ* 81, with *Oxalis*, *Linum*, and a few ambiguous genera, as *Aldrovanda*, *Drosera*, and *Averrhoa*, make up this Order. Linnæus has added several, more or less happily, in manuscript.

15. INUNDATÆ—are analogous to *Naïades* 6, and require as much correction.

16. CALYCIFLORÆ—part of *Elæagni* 24.

17. CALYCANTHEMÆ—contain many *Onagræ* 88, with the *Melastomæ* 90, and *Salicariæ* 91.

18. BICORNES—*Rhododendra* 50, and *Ericæ* 51.

19. HESPERIDEÆ—*Myrti* 89.

20. ROTACEÆ—*Lysimachiæ* 34, chiefly sect. 1, and *Gentianæ* 46.

A separate section comprises *Hyperica* 68, and *Cisti* 80; at least the genuine *Cisti*, sect. 1.

21. PRECIÆ—*Lysimachiæ* 34, chiefly sect. 2, and part of 3.

22. CARYOPHYLLEÆ—*Caryophylleæ* 82.

23. TRIHILATÆ—*Meliæ* 71, make the 1st section; *Sapindi* 65, *Acera* 66, and *Malpighiæ* 67, chiefly compose the 2d and 3d sections. *Tropæolum* is certainly better placed here by Linnæus than in Jussieu's *Gerania* 73.

24. CORYDALES—These have no analogy to any particular Order of Jussieu. The Linnæan genera

are *Melianthus* and *Monnieria*, for both which see remarks on Jussieu's *Rutaceæ* 81 ; *Epimedium*, see *Berberides* 78; *Hypecoum*, and *Fumaria*, see *Papaveraceæ* 62 ; *Leonticæ*, see *Berberides* 78 ; *Impatiens*, see *Gerania* 73; *Utricularia* and *Pinguicula*, see the end of *Lysimachiæ* 34. Jussieu's Order of *Berberides* 78 entirely escaped Linnæus.

25. PUTAMINEÆ—*Capparides* 64, except *Crescentia.* Linnæus has noted that this Order and the 24th should stand next to the 27th *Rhoeadeæ.*

26. MULTISILIQUÆ—*Ranunculaceæ* 61.

Seeds inserted into 1 suture only. *Linn. MS.*

27. RHOEADEÆ—*Papaveraceæ* 62.

Linnæus has brought hither *Nymphæa ;* see obs. on Jussieu's Ord. 62.

28. LURIDÆ—chiefly *Solaneæ* 41.

Aestivatio plicata. (Corolla plaited in the bud.) *Linn. MS.*

29. CAMPANACEÆ—*Campanulaceæ* 52 ; as also *Convolvuli* 43, and *Polemonia* 44, both well separated from the first by Jussieu. Linnæus has referred *Viola* to this Order, and has mentioned in manuscript *Parnassia*, with an exception on account of it's not being milky.

30. CONTORTÆ—*Apocineæ* 47.

Aestivatio contorta. (Corolla twisted, or it's segments oblique.) *Linn. MS.* This author, as well as Jussieu, has committed some errors with regard to particular genera. *Genipa* and *Gardenia*, both one genus, and *Macrocnemum*, belong to Jussieu's *Rubiaceæ* 57.

31. VEPRECULÆ—*Thymelææ* 25.

Thesium and *Santalum*, the latter added in manuscript, do not belong to it, but to Mr. Brown's *Santalaceæ* mentioned under Jussieu's *Elæagni* 24. *Scleranthus*, also added in manuscript, is referred by Jussieu to his *Portulaceæ* 86, not without a suspicion of it's relationship to his *Thymelææ* 25, or to *Thesium*.

32. PAPILIONACEÆ—such of the *Leguminosæ* 93, as have a papilionaceous corolla.

33. LOMENTACEÆ—the restof the *Leguminosæ* 93.

34. CUCURBITACEÆ—*Cucurbitaceæ* 97.

35. SENTICOSÆ—consist of the 2d, 3d and 4th sections of Jussieu's *Rosaceæ* 92; *Poterium* and *Sanguisorba* being properly brought hither from Ord. 54.

36. POMACEÆ—Sect. 1, with part of the 3d and 7th sections of *Rosaceæ* 92. *Ribes* is introduced here; see Jussieu's *Cacti* 85. *Punica*, one of the Linnæan *Pomaceæ*, is referred to *Myrti* 89, by Jussieu, perhaps less correctly.

37. COLUMNIFERÆ—*Malvaceæ* 74. *Camellia* and *Thea* are included. See *Aurantia* 70, sect. 3.

38. TRICOCCÆ—*Euphorbiæ* 96.

39. SILIQUOSÆ—*Cruciferæ* 63.

40. PERSONATÆ—*Pediculares* 35, *Acanthi* 36, *Vitices* 38, *Scrophulariæ* 40, and a few of the *Solaneæ* 41. These very distinct Jussieuan Orders were

probably not discriminated by Linnæus, in consequence of the habit he had acquired of considering his *Didynamia Angiospermia* as completely a natural assemblage.

41. ASPERIFOLIÆ—*Borragineæ* 42.

42. VERTICILLATÆ—*Labiatæ* 39.

43. DUMOSÆ—*Rhamni* 95 constitute the bulk of this Order; with one or two *Rutaceæ* 81, more of which latter are added in manuscript. *Viburnum*, *Sambucus* and *Rhus* are also placed here, with some marks of doubt, and Linnæus ingenuously confesses that he was dissatisfied with the whole.

44. SEPIARIÆ—*Iasmineæ* 37.

45. UMBELLATÆ— *Umbelliferæ* 60.

46. HEDERACEÆ—*Araliæ* 59, at least so far as concerns the first two genera, *Panax* and *Aralia*. *Xanthoxylon* is one of the *Rutaceæ* 81. The remainder, *Hedera*, *Vitis*, and *Cissus*, are proposed in the manuscript of Linnæus to be transferred to his 34th Order, *Cucurbitaceæ*, but he remarks that their fruit is not tricapsular, or trilocular. The tendrils and foliage may possibly have led to this idea of their affinity, which is certainly not tenable on other grounds.

47. STELLATÆ—*Rubiaceæ* 57, sect. 1 and 2, the remaining sections of Jussieu being faintly indicated by Linnæus in his sect. β and γ. The latter had not detected those characters, even of habit, which unite the shrubby *Rubiaceæ* into a very distinct and natural assemblage.

48. AGGREGATÆ—The two systems do not here accord, and it is necessary to explain some manuscript alterations of Linnæus. This Order is divided, in the Gen. Pl., into four sections. α consists of *Statice* only: β of *Hartogia, Brunia, Protea, Globularia, Leucadendron, Hebenstretia, Selago, Cephalanthus, Dipsacus, Scabiosa, Knautia* and *Allionia*: γ of *Valeriana, Morina, Boerhaavia* and *Circæa,* to which *Mirabilis* is added in manuscript: and δ of *Lonicera, Chiococca, Triosteum, Mitchella, Lisianthus* in manuscript, *Linnæa, Morinda, Conocarpus, Hillia* in manuscript, *Loranthus* and *Viscum.* The letter β is removed in the manuscript to *Cephalanthus;* so that the 1st section extends from *Statice* to *Selago,* inclusive; and is marked "*alternifoliæ inferæ,*" leaves alternate, flowers inferior (or germen superior). The other three sections, from *Cephalanthus* to *Viscum,* are marked "*oppositifoliæ superæ,*" leaves opposite, flowers superior. The first section thus extended abounds with errors. *Statice* and *Brunia* indeed, thought near akin by Linnæus, are puzzling genera, about which various opinions may be formed. Jussieu refers the former to his *Plumbagines* 33, the latter to his doubtful *Rhamni* 95. *Hartogia* is the same genus as *Diosma,* a true *Rutacea* 81, which Linnæus subsequently discovered. *Protea* and *Leucadendron* form the basis of Jussieu's and Brown's great Order of *Proteaceæ* 26, not detected by Linnæus, to which Jussieu was inclined to refer *Globularia;* but he left the latter at the end of his *Lysima-*

chiæ, where surely it is much misplaced. *Hebenstretia* and *Selago* are related to *Verbena*, see *Vitices* 38.

With respect to the opposite-leaved sections, β, γ and δ; *Cephalanthus, Chiococca, Mitchella, Morinda* and *Hillia* are well considered by Jussieu as *Rubiaceæ* 57. From *Dipsacus* to *Morina*, inclusive, are his *Dipsaceæ* 56. *Boerhaavia* and *Mirabilis* are *Nyctagines* 32. *Circæa* is one of the *Onagræ* 88. *Lonicera, Triosteum, Linnæa, Loranthus* and *Viscum* are *Caprifolia* 58. *Lisianthus* belongs undoubtedly to the *Gentianæ* 46.

From the above detail it appears, that there can hardly be a greater discordance of opinion than exists between Linnæus and Jussieu, concerning the plants of this Order; nor can the latter be denied the honour of having best, if not perfectly, understood their affinities.

49. COMPOSITÆ, Sect. α—*Cinarocephalæ* 54.
——————— sect. β—*Cichoraceæ* 53.
——————— sect. γ, ζ—*Corymbiferæ* 55.

50. AMENTACEÆ—*Amentaceæ* 99, with an exception or two, such as *Sloanea*, marked with a doubt by Linnæus, and referred by Jussieu to his *Tiliaceæ* 79; and *Pistacia*, one of the *Terebintaceæ* 94. *Cynomorium* is placed by Jussieu, with *Balanophora* of Forster, t. 50, among the *plantæ incertæ sedis.*

51. CONIFERÆ—*Coniferæ* 100, except *Equisetum*, one of the *Filices* 5.

52. COADUNATÆ—*Anonæ* 76, and *Magnoliæ* 75.

53. SCABRIDÆ—*Urticæ* 98.

Linnæus includes *Trophis*, which Jussieu did not determine; as also *Ulmus* with *Celtis*, both referred by the latter, less correctly perhaps, to his *Amentaceæ* 50. *Bosea* and *Acnida* are, with more justice, placed among his *Atriplices* 29.

54. MISCELLANEÆ—An Order composed of 8, truly miscellaneous, sections, most of them abrogated by the pen of Linnæus himself.

Sect. α, consisting of *Reseda* and *Datisca*, has not undergone any correction. *Reseda* is referred by Jussieu, somewhat paradoxically, to his *Capparides* 64; and *Datisca*, though allowed by him to be, in some points, akin to the former, stands among the unclassed genera.

β *Poterium* and *Sanguisorba*, are removed to the 35th Order, before *Agrimonia*, as they stand in Jussieu's *Rosaceæ* 92, sect. 3.

γ *Pistia* and *Lemna* are referred to the 15th *Inundatæ*. Jussieu has the former among his *Hydrocharides* 22, with a hint of it's probable affinity to *Aroideæ* 7, or *Aristolochiæ* 23; and *Lemna*, one of his *Naïades* 6, is, according to Mr. Brown, one of the *Hydrocharides*.

δ *Coriaria*, and *Empetrum* with a mark of doubt. The first is not thought referable to any Order by Jussieu; the latter is supposed akin to *Ericæ* 51.

ε *Achyranthes*, *Celosia*, *Amaranthus*, *Iresine*, *Gomphrena* and *Phytolacca* are all removed to the 5th section of the 12th Order, *Holeraceæ*. Jussieu has them all amongst his *Amaranthi* 30, except *Phytolacca*, which is one of the *Atriplices* 29.

ζ *Nymphæa* and *Sarracenia*, are both transferred to the 27th Order, with a query whether the latter especially may not be akin to *Asarum*, and therefore to the *Sarmentaceæ*, Ord. 11. We find that Linnæus once placed both these genera, as well as *Aristolochia*, and it's allies *Asarum* and *Cytinus*, in his 11th Order. He had a fanciful idea of an affinity between *Nymphæa* and *Sarracenia*, founded on the singular economy of the leaves in the latter. These he supposed to be contrived for the purpose of affording the plant a continual supply of water, which, like it's aquatic relation, it might require. Jussieu but faintly hints at the affinity in question, placing *Sarracenia* among the *plantæ incertæ sedis*.

η *Cedrela* and *Swietenia* are both removed to the 23d Order, along with *Turræa* Linn. Mant. 150. They all undoubtedly belong to the 1st section of that Order, being among the *Meliæ*, 71, of Juss.

ϑ *Telephium*, *Limeum* and *Corrigiola* are transferred to the 5th section of the *Holeraceæ*, Ord. 12. Jussieu has them all in his *Portulaceæ* 86, on account of their being furnished with petals; which circumstance here, as in the instance of his 82d Order compared with the 30th, breaks the natural chain of his system.

55. FILICES—*Filices* 5. Linnæus seems to have

had an idea of bringing hither *Lemna* and *Pistia*, for which it is difficult to suggest a motive, except he had any reason to doubt the accuracy of those who had described *Lemna*, and whom he had previously followed.

56. MUSCI—*Musci* 4.

57. ALGÆ—*Algæ* 2, and *Hepaticæ* 3. *Chara* is removed from hence, in the manuscript, to the 15th Order, *Inundatæ*.

58. FUNGI—*Fungi* 1.

A catalogue of 116 Genera, which Linnæus could not reduce to any of the foregoing Orders, is subjoined. Concerning 20 of these he afterwards satisfied himself; and at least half the rest are now sufficiently well understood to be referred to their proper places.

The following manuscript sketch, of an arrangement of the *Dicotyledones*, left by this great author at the end of his *Genera Plantarum*, may be thought worthy of preservation. It has undergone many changes and corrections, as might be expected. The meditations of such a mind cannot but furnish some ideas to others, however incomplete in themselves.

OPPOSITIFOLIÆ.

A line is drawn through this word, as if the author was dissatisfied with it.

Calyciflore 16
Calycanthemæ 17

ALTERNIFOLIÆ.

Cucurbitaceæ 34
Hederaceæ 46
Umbellatæ 45
Compositæ 49
Amentaceæ 50

Caryophylleæ 22

Aggregatæ 48
Stellatæ 47
Sepiariæ 44
Dumosæ 43

Succulentæ 13
Gruinales 14

Contortæ 30
Rotaceæ 20

Hesperideæ 19

Inundatæ 15
Holeraceæ 12
Scabridæ 53
Vepreculæ 31

Preciæ 21

Coniferæ 51
Coadunatæ 52

Papilionaceæ 32
Lomentaceæ 33
Corydales 24
Multisiliquæ 26
Rhoeadeæ 27
Putamineæ 25
Siliquosæ 39

Asperifoliæ 41
Verticillatæ 42

Campanaceæ 29
Luridæ 28
Personatæ 40

Senticosæ 35
Pomaceæ 36

Columniferæ 37

Tricoccæ 38
Trihilatæ 23

Bicornes 18

The first idea of Linnæus, in the above scheme, appears to have been to throw the dicotyledonous Orders into two great Sections, characterized, in a general way, by their opposite or alternate leaves, with subdivisions indicating the Orders most allied to each other. But in the execution of this plan, difficulties immediately arose, especially respecting the *Verticillatæ* 42, whose leaves are invariably opposite, and the *Asperifoliæ* 41, as regularly furnished with alternate leaves. Yet these two Orders could not, in any natural arrangement, be placed asunder. So the *Personatæ* 40, chiefly opposite-leaved, were necessarily to be classed near the *Luridæ* 28, and others, with alternate leaves. It is needless to point out exceptions amongst other Orders, or tribes of Genera.

No discriminating character of his Orders, or "Fragments," was ever formed by Linnæus. On the contrary, he adverts under almost every one of them, in the *Prælectiones* published by Giseke, to the anomalies or exceptions which militate against such an attempt. His judgment, as I have already hinted, is confirmed by the result of the labours of those who have undertaken this arduous task; though the world is extremely indebted to them for having, in the face of such obstacles, entered upon it. The difficulties, apparent contradictions, and various exceptions, which embarrass them in the detail of their performance, are inherent in the organization of the vegetable body, in which there is throughout no positive or mathematical certainty. A few practical observations, illustrative of this truth, may, not altogether unprofitably, here close the subject.

Philosophers have attributed to Nature a plastic power, by which form and organization are given to substances apparently homogeneous, and destitute of any particular configuration. Thus the fluid of the egg changes to an organized animal body; and thus the blood and lymph, in the stump of an amputated limb, become occupied with muscles, blood-vessels and nerves, like the corresponding parts of the animal frame. Analogous facts, though less evidently perceptible, are to be traced, without any uncertainty, in the vegetable body. In the latter we may perhaps, even more positively than in animals, satisfy ourselves of the influence of particular circumstances, in causing a different organization. Many a plant may be extensively increased by cuttings or by roots, for a succession of years, without producing any seeds, or even the least rudiments of flowers. But if one or more of these cuttings or roots should be treated differently from the rest, with respect to their allotted portion of water, heat, or nourishment, such may very probably bear flowers and seeds, as happened by chance to the *Solandra* at Kew; see Introd. to Botany, chap. 14. In other words, the same organic matter which, under the influence of certain causes, assumes the form of branches and leaves, in different circumstances becomes flowers and seeds. If we trace this indefinite power of organization a step further, we perceive that the materials of a perfect flower, destined to form seed, are sometimes transformed into a mutilated or an over-luxuriant one, consisting of multiplied petals only, in the place of the organs essential to the propagation of the species; and in certain circumstances, the whole flower itself is replaced by a *gemma* or bud (26), when the plant which bears it is termed viviparous.

So with respect to the appropriate organization of particular plants. Each species is naturally furnished with flowers, of a determinate structure, having a certain number of stamens and pistils, as well as of divisions or parts in their integuments, all which are connected together, in an appropriate mode, in every flower. But circumstances sometimes cause an alteration, frequently in the comparative number of such parts or divisions, though very rarely in their mode of connexion.

Such are accidental variations, which a competent degree of attention and caution in the observer will enable him to guard against. Their study, cautiously pursued, may often throw light on those more permanent diversities of structure, which occupy the studies of the profound botanist, and of which I would now attempt somewhat of a comparative view.

In general, the aberrations of Nature in plants bear a considerable analogy to her accidental variations, but are, of course, much more diversified and extensive. Thus, in tribes very nearly akin, a corresponding number in the parts of fructification is found liable to many more exceptions than a similarity of connexion or insertion. In the *Caryophylleæ*, Juss. 82. Linn. 22, some have 10, others 5, stamens; some have 5, others 3 or 2, styles; in the *Bicornes* of Linn. 18 (the *Rhododendra* 50, and *Ericæ* 51, of Jussieu) the differences between 4 and 5, 8 and 10, or 5 and 10, are so frequent, as to cause great trouble in classing these plants, after the Linnæan artificial system. But the instance of an inferior germen in *Vaccinium*, is a wide and remarkable difference, of extremely rare occurrence, between that genus and it's near relations *Menziesia*, *Erica*, *Arbutus*, &c.

In general, variations or diversities of structure have been thought to take place most in the parts of the flower, and especially in those accessory, rather than essential, organs, the calyx and corolla. The production of the fruit and seed, especially of the latter, being the main object of all the rest, many botanists have, reasonably enough, concluded, that the peculiar organization, and even the number of parts, in the seed-vessel, and, above all, the form and number of the seeds, were likely to furnish indications of the most important and invariable principles of affinity or distinction. Even the diversities in the internal parts, or materials, of a seed, have of late been laid under contribution, for the purposes of methodical arrangement; as appears from the foregoing explanations of different botanical systems.

As far as regards the comparative number of seeds, the slightest observation will teach any person, that Nature has not always made this circumstance of importance, in the indication of natural affinities. The thing itself is often indeterminate, several rudiments of seeds being frequently provided, though only one regularly comes to perfection. More frequently are observable plants with numerous seeds in a cell, or capsule, which are nearly, or very closely; allied to others with only 1 or 2. See the *Onagræ* 88, of Jussieu, the *Cruciferæ* 63, the genus *Juncus*, and many besides. The provision of seed to each vegetable is indeed of the last importance; but the quantity is, comparatively, immaterial, variable, or precarious. It seems therefore that number, as a principle of arrangement, may well be expected to prove more treacherous here than in other cases.

The nourishment of a seed, in the first stages of germination, depending generally on the albumen, in whatever form or state that substance may exist, is variously conducted, according to circumstances, in plants otherwise nearly allied; witness the papilionaceous family, where the albuminous matter is lodged in cotyledons, that in some species rise into seminal leaves, in others decay speedily under ground. In some plants, as we have seen, the albumen is evident in a distinct and separate form; while in others, nearly akin, no such substance exists, except, as must be presumed, in the body of each cotyledon. Here again therefore, however essential the part in question, the mode of it's existence appears to be of very subordinate consideration, and should not be allowed, in the details of systematic arrangement, to overrule characters which are judged, by experience or analogy, to be more important. The able writers whose labours we have been contemplating, the chief systematic botanists who have adverted at all to the albumen, have been well aware of this.

What has just been remarked, of the inconstancy of number in the seeds of particular plants, and of it's great diversity in species or genera nearly akin, may possibly diminish the apparent absurdity of considering the great differences between the fruit of *Begonia* and *Polygonum* or *Rumex*, and between that of some *Campanulaceæ* and the *Compositæ*, as a matter of but secondary importance, and may reconcile us to the opinion that such differences should give way, in both cases, to strong points of agreement. Even the great distinction between the inferior germen of *Begonia*, and the superior one of the Order of *Polygoneæ*, Juss. 28, is invalidated by the above instance of *Vaccinium*; and the coincidence of habit is so remarkable, that I cannot but confess myself very anxious to ascertain a decisive affinity, or analogy, in the fructification, lest the great fundamental principle of all sound botanical classification should, in any degree, be undermined.

INDEX.

Abies, 191
Abortive flowers, 28
Abroma, 150, 183
Abronia, 94
Abrus, 179
Abuta, 154
Acæna, 173
Acalypha, 185
Acanthi, 96, 203
Acanthus, 97
Acaules, 6
Accumbent cotyledons, 139
Acer, 142
Acera, 141, 201
Achania, 149
Achenium, 23
Achillea, 124
Achras, 111
Achyranthes, 92, 207
Acia, 173
Acioa, 173
Acisanthera, 171
Acnida, 207
Aconitum, 137
Acorus, 67
Acotyledones, 34, 35, 61, 63
Acouroa, 179
Actæa, 137
Aculeus, 12
Adanson, 31
Adansonia, 150
Adelia, 185
Adenanthera, 177
Adonis, 136
Adoxa, 164
Aegiceras, 111
Aegopricon, 185
Aegopodium, 134
Aeschynomene, 179
Aesculus, 41, 142
Aestivatio, 22
Aethusa, 134
Agapanthus, 75
Agasyllis, 134
Agathis, 191
Agave, 74
Agdestis, 154
Aggregatæ, 205
Aggregate flowers, 29
Agrimonia, 173, 207
Agrostemma, 161
Agrostis, 69
Agyneia, 185
Aira, 69
Aitonia, 146
Aizoon, 166
Ajuga, 99
Ala, 27
Alæ, 175
Alamanda, 109
Alangium, 168, 169
Albuca, 75
Albumen, 25, 33
Alchemilla, 173
Aldrovanda, 201
Aletris, 75
Aleurites, 185
Algæ, 34, 47, 63, 209
Alisma, 73
Alismaceæ, 73
Allionia, 126, 205
Allium, 74, 75, 199
Allophyllus, 145
Alnus, 190
Aloe, 75
Alopecurus, 69

Alpinia, 79, 81
Alsine, 161
Alstonia, 113
Alstroemeria, 76
Alternifoliæ, 209
Althæa, 42, 149 [200, 208
Amaranthi, 91, 92, 160, 165,
Amaranthus, 92, 207
Amaryllideæ, 76
Amaryllis, 75
Ambelania, 109
Ambora, 189
Ambrosia, 122
Amellus, 124
Amentaceæ, 50, 189, 206, 207
Amentaceous flowers, 19, 29
Amentum, 19
Amerimnon, 179
Ammania, 171
Ammi, 134
Amomum, 79, 81
Amorpha, 179
Amygdaleæ, 173
Amygdalus, 173
Amyris, 181
Anacardium, 181, 200
Anagallis, 95
Anagyris, 177
Anassa, 109
Anchusa, 103
Ancistrum, 173
Andira, 179
Andrachne, 185
Andromeda, 115
Androsace, 96
Anemone, 136
Anethum, 134
Angelica, 134
Angiospermia, 44, 204
Anguria, 187
Annual roots, 4, 17
Anoda, 149
Anona, 153
Anonæ, 152, 206
Anopterus, 108
Anthemis, 124
Anthera, 21
Anthericum, 75
Antholyza, 76
Anthospermum, 127
Anthoxanthum, 69
Anthriscus, 134
Anthyllis, 178
Antiaris, 189
Antichorus, 156
Antirrhinum, 100
Aotus, 177
Apalatoa, 180
Apeiba, 156
Apetalous flower, 28, 61
Aphanes, 173
Aphyllanthes, 73
Apium, 134
Apluda, 69 [202
Apocineæ, 15, 108, 110, 126,
Apocynum, 109, 110
Aponogeton, 66
Aporetica, 141
Appendages, 11, 12, 56
Apple, 23, 172
Aquilegia, 137
Aquilicia, 111, 146
Arabis, 139
Arachis, 178
Aralia, 132, 204
Araliæ, 131, 132, 204
Araucaria, 191
Arbutus, 115, 211
Arctotis, 124
Areca, 71
Arenaria, 161
Arethusa, 82
Argemone, 137
Argolasia, 77
Argophyllum, 115
Argythamnia, 185
Arillus, 27
Arista, 19
Aristolochia, 86, 208
Aristolochiæ, 76, 85, 199, 207
Armeniaca, 173
Aroideæ, 67, 68, 76, 198, 207

Arouna, 180
Artedia, 134
Artemisia, 124
Artificial classes, 31
Artocarpus, 189
Aruba, 158
Arum, 67
Aruna, 180
Arundo, 69
Asarum, 86, 208
Ascium, 140
Asclepiadeæ, 15, 21, 110
Asclepias, 109, 110
Ascyrum, 143
Aspalathus, 178
Asparagi, 71, 75, 199
Asparagus, 72, 75
Asperifoliæ, 102, 204, 211
Asperugo, 103
Asperula, 127
Asphodeleæ, 72
Asphodeli, 72, 74, 75, 199
Asphodelus, 75
Aspidium, 46, 66
Assonia, 150
Aster, 106, 123
Astragalus, 179
Astrantia, 134
Athamantia, 134
Atragene, 136
Atriplex, 91
Atriplices, 91, 117, 200, 207, [208
Atropa, 102
Aubletia, 156
Aucuba, 183
Aurantia, 145, 150, 203
Averrhoa, 181, 201
Awn, 19
Axyris, 200
Ayenia, 150
Aylanthus, 181
Azalea, 112, 114
Azorella, 134

Bacca, 23, 26
Bacopa, 165
Bæa, 100
Bæckea, 167, 169
Bagassa, 189
Balanophora, 206
Balsamina, 135, 148
Banara, 156
Banksia, 88
Bannisteria, 142
Baptisia, 177
Barleria, 97
Barnadesia, 123
Barren flower, 28
Barreria, 155
Barringtonia, 169
Bartsia, 96
Basella, 91
Bassia, 111
Bauera, 164
Bauhinia, 177
Beak, 27
Beaufortia, 169
Begonia, 117, 200, 216
Bejaria, 114
Bellis, 123
Bellonia, 128
Berberides, 154, 202
Berberis, 155
Bergera, 145
Bergia, 161
Berry, 23, 24
Besleria, 100
Betula, 190
Bicornes, 201, 211
Bidens, 124
Biennial roots, 4, 17
Bignonia, 106
Bignoniaceæ, 106
Bignoniæ, 105
Bipinnula, 82
Biserrula, 179
Bixa, 156
Blackwellia, 174
Blæria, 115
Blakea, 170
Blandfordia, 75
Blepharanthes, 188

Blitum, 91
Bocconia, 138
Boehmeria, 189
Boerhaavia, 94, 205, 206
Bolax, 134
Bombax, 150
Bontia, 102
Boragineæ, 102, 204
Borago, 103
Borassus, 71
Borbonia, 178
Border, 20
Boronia, 158, 159
Boscia, 140
Bosea, 207
Bossiæa, 178
Botany, economical, 2
——— physiological, 2
——— systematical, 1
Bowlesia, 134
Brabeium, 88
Brachysema, 178
Bractea, 12, 18
Brassica, 139
Brathys, 143, 144
Breweria, 104
Briza, 69
Bromelia, 74
Bromeliæ, 73, 199
Bromus, 69
Brosimum, 189
Brossæa, 115
Browallia, 100
Brownea, 180
Brunfelsia, 102
Brunia, 183, 205
Brunonia, 118
Bryonia, 187
Bryum, 65
Bubon, 134
Bubroma, 150
Buchnera, 101
Bucida, 86, 167, 200
Buddleia, 100
Buds, 8
Buffonia, 161
Buganvillæa, 94
Bugula, 99
Bulbocodium, 75
Bumalda, 183
Bumelia, 111
Bunch, 16
Bunium, 134
Buphthalmum, 124
Bupleurum, 134
Burmannia, 74, 81
Bursaia, 154
Bursera, 181
Burtonia, 178
Butea, 178
Butomus, 41, 73
Butonica, 169
Büttneria, 150
Büttneriaceæ, 183
Buxus, 185

Cacalia, 123
Cachrys, 134
Cacoucia, 167
Cacti, 164, 203
Cactus, 164, 200
Cadaba, 140
Cæsalpinia, 177
Calamariæ, 198
Calamus, 198
Calathea, 79
Calceolaria, 100
Calchas, 145
Calendula, 123
Calla, 67
Callicarpa, 98
Callicocca, 129
Calligonum, 200
Callistachya, 178
Callistemon, 169
Callitriche, 66, 167
Callitris, 191
Calodendrum, 158
Calophyllum, 145
Calothamnus, 169
Caltha, 137
Calycanthemæ, 201

Calycanthus, 173
Calyciflorœ, 201
Calycomis, 164
Calyculus, 18
Calyptra, 65
Calyptranthes, 169
Calyx, 17—19
Camellia, 146, 203
Cameraria, 109, 110
Campanaceœ, 202
Campanula, 118
Campanulaceœ, 117, 202, 216
Cananga, 153
Canarina, 218
Canarium, 181
Candollea, 152
Canella, 146
Canephora, 129
Canna, 79
Cannabis, 189
Cannœ, 78, 199
Canneœ, 79
Cantua, 105
Capitulum, 15, 135
Capparides, 140, 202, 207
Capparis, 41, 140
Caprifolia, 129, 206
Caprifolium, 130
Capsicum, 122
Capsula, 22
Caragana, 179
Cardamine, 41
Cardiospermum, 141
Carduus, 42, 121
Carex, 68
Cargilla, 113
Carica, 43, 187
Carina, 175
Carissa, 109
Carlina, 121
Carolinea, 150
Carpella, 153
Carphalea, 128
Carpinus, 190
Carpodetus, 183
Carum, 134
Caryophylleœ, 105, 159, 165, 201, 213
Caryophyllus, 168
Caryota, 71
Cassia, 176
Cassine, 182
Cassuvium, 181
Cassytha, 90
Castilleia, 96
Casuarina, 190, 191
Casuarineœ, 190
Catalpa, 106
Catesbœa, 128
Catimbium, 78
Catinga, 169
Catkin, 19, 24
Caturus, 185, 189
Caucalis, 134
Cauda, 27
Caudex, 3
Caulis, 5
Ceanothus, 183
Cecropia, 189
Cedrela, 147, 208
Celastrinœ, 182
Celastrus, 182
Celosia, 92, 207
Celsia, 101
Celtis, 190, 207
Cenchrus, 69
Centaurea, 42
Centella, 199
Central column, 22
Cephalanthus, 129, 205, 206
Cephalotus, 174
Cerastium, 161
Cerasus, 173
Ceratonia, 176
Ceratopetalum, 164
Ceratophyllum, 66
Ceratosanthes, 187
Ceratostema, 118
Cerbera, 109
Cercis, 177
Cercodea, 166
Cerinthe, 103

Ceropegia, 109, 110
Cestrum, 102
Chærophyllum, 134
Chamærops, 71
Chara, 66, 209
Cheiranthus, 140
Chelidonium, 138
Chelone, 105
Chenopodeæ, 91
Chedopodium, 91
Cherleria, 161
Chiococca, 128, 205, 206
Chionanthus, 97
Chironia, 107
Chlora, 107
Chomelia, 128
Chorizema, 177
Chrysanthemum, 123
Chrysobalanus, 173
Chrysophyllum, 111
Chrysosplenium, 164
Cicca, 185
Cicer, 179
Cichoraceæ, 120, 206
Cichorium, 120
Cicuta, 134
Cienfuegosia, 150
Cimicifuga, 137
Cinarocephalæ, 121, 135, 206
Cinchona, 128
Ciponima, 113
Circæa, 166, 205, 206
Cirrus, 12
Cissampelos, 154
Cissus, 147, 204
Cisti, 156, 193, 201
Cistineæ, 193
Cistus, 156
Citharexylum, 98
Citrus, 145
Classes, 30, 40, 61
Classification, 2, 30
Claw, 20
Claytonia, 165
Clematis, 136
Cleome, 139, 140
Clerodendrum, 98
Clethra, 115
Clibadium, 122
Cliffortia, 173
Clitoria, 178
Clusia, 144
Cluster, 14
Cluytia, 185
Cneorum, 181
Cnestis, 181
Cnicus, 121
Cnidium, 134
Coadunatæ, 206
Cobæa, 106
Cocculus, 154
Coccum, 23
Cocos, 71
Codia, 164
Coffea, 128
Coix, 69
Colchicum, 73, 199
Coldenia, 103
Colletia, 183
Columella, 22
Columnea, 100
Columniferæ, 150, 203
Colutea, 179
Comarum, 173
Combretaceæ, 86, 167
Combretum, 167
Commelina, 73
Commelineæ, 73
Commersonia, 183
Comocladia, 181
Complete flower, 28
Compositæ, 124, 206, 216
Compositus flos, 28
Compound flowers, 18, 27—29
Comptonia, 190
Cone, 24
Coniferæ, 50, 190, 206
Conium, 134
Connarus, 181
Conobea, 96
Conocarpus, 167, 205
Conoria, 155

Contortæ, 109, 202
Convallaria, 72
Convolvuli, 103, 193, 200, 202
Convolvulus, 104
Cookia, 145
Copaifera, 180
Corchorus, 156, 174
Corculum, 24
Cordia, 103
Coreopsis, 124
Coriandrum, 134
Coriaria, 207
Cornucopiæ, 69
Cornus, 131
Cornutia, 98
Corolla, 20
Coronariæ, 199
Coronilla, 179
Coronopus, 139
Corræa, 158
Corrigiola, 165, 208
Corydales, 201
Corylus, 190
Corymb, 14
Corymbiferæ, 121, 206
Corymbus, 14
Corynocarpus, 155
Corypha, 71
Cossignia, 141
Costus, 79, 81
Cotula, 124
Cotyledon, 163
Cotyledones, 24, 139
Coublandia, 177
Couepia, 173
Coumarouna, 179
Couroupita, 169
Coussapoa, 189
Coutarea, 128
Coutoubea, 107
Crambe, 139
Craniolaria, 106
Crassula, 163
Cratægus, 172
Cratæva, 140
Crenea, 171
Crescentia, 102, 202
Cressa, 104
Crest, 26
Crinum, 75
Crithmum, 134
Crocus, 76
Crotalaria, 178
Croton, 185
Crowea, 158
Crown of the root, 3
Crucianella, 127
Cruciferæ, 138, 203, 215
Crudia, 180
Cryptandra, 183
Cryptogamia, 8, 29, 43
Cubæa, 177
Cucubalus, 160, 161
Cucumis, 187
Cucurbita, 187
Cucurbitaceæ, 186, 203, 204
Culmus, 6
Cuminum, 134
Cunonia, 164
Cunoniaceæ, 130, 164
Cupania, 141
Cuphea, 171
Cupressus, 191
Cupula, 191
Curatella, 152
Curcuma, 79, 81
Cuscuta, 104, 182, 200
Cusparia, 158
Cussonia, 132
Cyamus, 85
Cyanus, 42
Cycadeæ, 198
Cycas, 198
Cyclamen, 96
Cyclopia, 177
Cydonia, 172
Cyma, 15
Cyme, 15
Cynanchum, 109, 110
Cynoglossum, 103
Cynometra, 177
Cynomorium, 206

Cyperoideæ, 68, 198
Cyperus, 68
Cyphia, 118
Cypripedium, 82—84
Cyrilla, 115, 116
Cytinus, 86, 208
Cytisus, 178

Dacrydium, 191, 192
Dactylis, 69
Dais, 87
Dalbergia, 179
Dalea, 178
Dalechampia, 185
Daphne, 41, 87
Datisca, 207
Datura, 101
Daucus, 134
Daviesia, 177
Decagynia, 44
DeCandolle's method, 195
Decandria, 41
Decumaria, 168
Deguelia, 179
Delima, 152, 173
Delphinium, 137
Dendrobium, 42
Detarium, 180
Diadelphia, 42, 48, 176
Diandria, 40
Dianella, 75
Dianthus, 41, 161
Dichondra, 104
Diclines, 61
Diclinia, 49 [—192
Dicotyledones, 33, 36, 61, 85
Dicranum, 46, 65
Dictamnus, 158
Didynamia, 41, 101, 204
Diervilla, 130
Differentiæ, 54, 55
Digitalis, 100
Digynia, 44
Dilatris, 77
Dillenia, 152
Dilleniaceæ, 152, 173
Dillwynia, 178
Dimocarpus, 141
Dimorpha, 177
Diodia, 127
Dioecia, 43, 46
Dioecious flowers, 28
Dioscorea, 72
Diosma, 158, 205
Diosmeæ, 158, 159
Diospyros, 113
Diphysa, 179
Diplolæna, 159
Dipsaceæ, 125, 135, 206
Dipsacus, 126, 205, 206
Dipteryx, 177, 179
Disa, 82
Disandra, 101
Dissepimenta, 22
Dodecagynia, 44
Dodecandria, 41
Dodecas, 168, 169
Dodecatheon, 96
Dodonæa, 181
Dolichos, 178
Dombeya, 106, 191
Donatia, 161
Dondia, 134
Doronicum, 123
Dorstenia, 189
Dracæna, 72
Dracocephalum, 99
Drosera, 140, 201
Drupa, 23
Drusa, 133
Dryandra, 185
Dryas, 173
Drypis, 161
Dumosæ, 204
Duranta, 98
Durio, 140
Duroia, 128
Dust, 21

Ebenaceæ, 112, 113
Echinophora, 134
Echites, 109, 110

Echium, 103
Eclipta, 120
Edwardsia, 177
Ehretia, 103
Ehrharta, 69
Ekebergia, 146
Elæagni, 86, 167, 201
Elæagnus, 86, 87
Elæocarpus, 145
Elaterium, 187
Elatine, 161
Elatostema, 189
Elcaja, 146
Elettaria, 81
Ellisia, 103
Elymus, 69
Embothrium, 88
Embryo, 24, 33
Embryopteris, 113
Empetrum, 115, 207
Empleurum, 158
Enneagynia, 44
Enneandria, 41
Enourea, 141
Ensatæ, 97, 199
Epacrideæ, 116
Epacris, 40, 115
Eperua, 177
Ephedra, 191
Epibaterium, 154
Epidendrum, 82
Epigæa, 115
Epigynous insertion, 37, 61
Epilobium, 167
Epimedium, 155, 202
Episperm, 26
Equisetum, 46, 206
Eranthemum, 98
Erica, 112, 115, 116, 211
Ericæ, 115, 117, 201, 207, 211
Erigeron, 123
Erinus, 96
Eriocalia, 134
Eriocaulon, 73
Eriogonum, 91
Eriophorum, 68
Eriostemon, 158, 159
Erithalis, 128
Erodium, 148
Ervum, 179
Eryngium, 135
Erythræa, 107
Erythrina, 178
Erythronium, 73
Erythroxylum, 143
Escallonia, 167
Essential characters, 38, 50, 51
Ethulia, 124
Eucalyptus, 169
Euchilus, 198
Eucomis, 75
Eudesmia, 169
Eugenia, 168
Euodia, 158
Euonymus, 182
Euosma, 108
Eupatorium, 123
Euphorbia, 185
Euphorbiæ, 159, 184, 203
Euphoria, 141
Euphrasia, 96, 100
Euryandra, 152
Eutaxia, 178
Evolvulus, 104
Exacum, 107
Excoecaria, 185
Exoacantha, 134

Faba, 179
Fabricia, 169
Fagara, 158, 181
Fagonia, 158
Fagræa, 109
Fagus, 190
Faramea, 129
Farsetia, 139
Fasciculus, 15
Faux, 20
Ferns, 18, 35
Ferraria, 76
Ferreola, 113
Fertile flower, 28

Fertilis flos, 28
Ferula, 133
Feuillea, 187
Fibres, 3
Ficaria, 136
Ficoideæ, 157, 161, 165, 166, [173, 200
Ficus, 43
Filago, 123
Filamentum, 21
Filices, 18, 35, 46, 198, 206, [208
Fischera, 134
Fissilia, 145
Flacourtia, 156
Flemingia, 178
Floral leaf, 12
Florets, 28
Flos, 17
Flosculi, 28
Flosculosi, flores, 15, 29
Flower, 17
Flower-budding, 22
Flower-stalks, 7
Foetidia, 169
Foliola, 10
Folium, 8
Folliculus, 23
Footstalks, 7
Forgesia, 118
Forskalea, 189
Fothergilla, 190
Fragaria, 173
Frankenia, 161
Fraxinus, 97
Fringe of Mosses, 65
Fritillaria, 73
Frond, 8
Frons, 7
Fructification, 17, 57
Fructus, 17
Fruit, 17
Fuchsia, 167
Fucus, 47
Fugosia, 150
Fulcra, 11
Fumaria, 42, 138, 202
Fungi, 8, 34, 47, 63, 209
Galanthus, 40, 76
Galax, 164
Galaxia, 76
Galedupa, 179
Galega, 179
Galenia, 91
Galipea, 158
Galium, 127
Galopina, 127
Gambogia, 144
Garcinia, 144
Gardenia, 128, 203
Garidella, 137
Gastonia, 132
Gastrolobium, 178
Gaultheria, 115
Gaura, 167
Gelsemium, 109
Gemma, 8
Genera, 30, 51
Generic characters, 38
Genipa, 128, 203
Genista, 178
Gentiana, 107
Gentianæ, 106, 201, 206
Geoffrœa, 179
Gerania, 147, 201, 202
Geranium, 42, 148
Gerardia, 100
Germ, 24
Germen, 21
Geruma, 146
Gesneria, 118
Gethyllis, 75
Getonia, 167
Geum, 173
Gills, 19
Ginannia, 177
Ginoria, 171
Gisekia, 165
Gladiolus, 76
Glands, 13, 21
Glandula, 13
Glaucium, 138
Glaux, 171
Gleditsia, 176

Glinus, 166
Globba, 40, 79, 81
Globularia, 96, 205
Gloriosa, 73
Glossoma, 183
Glossopetalum, 182
Gluma, 19
Glycine, 178
Glycyrrhiza, 179
Gnaphalium, 123
Gnetum, 189
Gnidia, 87
Gomozia, 128
Gompholobium, 177
Gomphrena, 92, 207
Gonocarpus, 167
Goodenia, 118
Goodenoviæ, 118
Goodia, 178
Gordonia, 146, 150
Gossypium, 149
Gouania, 183
Goupia, 182
Gramina, 198
Gramineæ, 68
Grangeria, 173
Grasses, 6, 68
Gratiola, 100
Grewia, 156
Grias, 144
Grimmia, 65
Grislæa, 171
Gronovia, 186, 187
Gruinales, 201
Guaiacanæ, 112
Guaiacum, 158
Guapurium, 168
Guarea, 146
Guazuma, 150
Guettarda, 128
Guiera, 167
Guilandina, 177
Gunnera, 189
Gustavia, 169
Guttiferæ, 144
Gymnocarpus, 165
Gymnocladus, 176
Gymnospermia, 44
Gymnostomum, 65
Gynandria, 42, 84
Gynopogon, 109
Gypsophila, 161

Hæmanthus, 75
Hæmatoxylum, 177
Hæmodoraceæ, 77
Hair, 13
Halesia, 113
Hallia, 178
Halorageæ, 167
Haloragis, 166, 167
Hamadryas, 136
Hamamelis, 155
Hamelia, 129
Hartogia, 205
Hasselquistia, 133
Head, 15
Hebe, 100
Hebenstretia, 98, 205, 206
Hedera, 131, 132, 204
Hederaceæ, 204
Hedycaria, 189
Hedychium, 79, 81
Hedycrea, 173
Hedyotis, 127
Hedysarum, 179
Heisteria, 145, 200
Helianthemum, 156
Helianthus, 124, 157
Heliconia, 78
Helicteres, 150
Heliocarpus, 156
Heliotropium, 103
Helleborus, 137
Hellenia, 81
Hemerocallideæ, 75
Hemerocallis, 75
Hemimeris, 100
Hepaticæ, 34, 46, 64, 209
Heptagynia, 44
Heptandria, 41
Heracleum, 133

Hermannia, 156
Hermas, 134
Hernandia, 90
Herniaria, 93, 242
Hesperideæ, 201
Heuchera, 163
Hevea, 185
Hexagynia, 44
Hexandria, 40
Hibbertia, 152
Hibiscus, 149
Hieracium, 120
Hillia, 128, 205, 206
Hilum, 26
Hippia, 124
Hippocratea, 142
Hippocrepis, 179
Hippomane, 185
Hippophäe, 86, 87
Hippuris, 66, 167
Hirtella, 173
Hoitzia, 105
Holcus, 69
Holeraceæ, 200, 208
Holosteum, 160
Homalium, 174
Honey, 21
Hookeria, 46
Hopea, 113
Hortensia, 131
Hottonia, 95
Houstonia, 127
Hovea, 178
Hovenia, 183
Hudsonia, 115
Hugonia, 150
Humulus, 189
Hura, 185
Husk, 19
Hyacinthus, 75
Hydrangea, 131, 164
Hydrastis, 136
Hydrocharideæ, 67
Hydrocharides, 84, 198, 207
Hydrocharis, 85
Hydrocotyle, 133, 199
Hydrophylax, 129
Hydrophyllum, 103
Hymenæa, 177
Hyobanche, 96
Hyoscyamus, 101
Hypecoum, 138, 139, 202
Hyperica, 143, 145, 201
Hypericum, 42, 143, 144
Hypnum, 65
Hypocalyptus, 178
Hypogynous insertion, 37 61
Hypoxis, 76

Iberis, 139
Icica, 181
Icosandria, 41
Ignatia, 109
Ilex, 182
Illecebreæ, 93
Illicium, 151
Imbricaria, 111, 169
Impatiens, 135, 148, 202
Imperatoria, 134
Incarvillea, 105, 106
Incertæ sedis plantæ, 192
Incumbent cotyledons, 139
Indigofera, 179
Inflorescence, 14—16, 56
Infloreſcentia, 14—16
Inocarpus, 111
Insertion, 32, 41
Inundatæ, 201, 207, 209
Inula, 42, 123
Involucellum, 18
Involucrum, 18
Ipomæa, 104
Ipomopsis, 105
Iresine, 207
Irides, 76, 77, 199
Iris, 76
Isatis, 139
Isnardia, 171
Isopyrum, 137
Itea, 114—116
Iva, 122
Ixia, 76

Ixora, 128, 130

Jacaranda, 106
Jacksonia, 178
Jacquinia, 111
Jambolifera, 158
Jasione, 118
Jasmineæ, 97, 204
Jasminum, 97
Jatropha, 185
Jonquetia, 181
Josephinia, 106
Juglans, 181
Junci, 72, 74, 198, 199
Juncus, 73, 215
Jungermannia, 46, 64
Jungia, 169
Juniperus, 191
Jussiæa, 167
Jussieu, 31, 37, 60
Justicia, 97

Kæmpferia, 79, 81, 199
Kalmia, 114
Keel, 175
Kennedia, 178
Kerria, 174
Kiggelaria, 185
Kirganelia, 185
Kleinhovia, 150
Knautia, 126, 205
Knoxia, 127
Kuhnia, 123

Labatia, 113
Labiatæ, 99, 101, 204
Lachenalia, 75
Laetia, 156
Lagerstromia, 171
Lagoecia, 132
Laguna, 149
Lagunæa, 149
Lamina, 20
Lamium, 41, 99
Lanaria, 77
Lardizabala, 154
Larix, 191
Laserpitium, 134
Lasiopetalum, 183
Lathræa, 96
Lathyrus, 179
Laugeria, 128
Lauri, 90, 200
Laurus, 90, 200
Lavandula, 99
Lavatera, 149
Lawsonia, 171
Leaflets, 10
Leaves, 8—11, 56
Lebeckia, 178
Lecanora, 46
Lechea, 161
Lecythis, 169
Ledum, 114
Leea, 111, 146, 147
Legume, 23
Legumen, 23
Leguminosæ, 174, 203
Lemna, 66, 207, 208
Lentibulariæ, 96, 200
Leontice, 155, 202
Leontodon, 120
Lepidium, 139
Leptospermum, 168
Lessertia, 179
Leucadendron, 205
Leucoium, 76
Licania, 173
Lichenes, 34, 46, 64
Ligulate florets, 28
Ligusticum, 134
Ligustrum, 97
Lilac, 97
Lilia, 73, 199
Lilium, 73
Limbus, 20
Limeum, 165, 208
Limodorum, 82
Limonia, 145
Limosella, 95, 101
Lindernia, 100
Lindsæa, 66

Linnæa, 130, 206
Linnæan System, 40—51
Linum, 161, 201
Liquidambar, 190
Liriodendrum, 151
Lisianthus, 107, 205, 206
Lita, 107
Lithospermum, 103
Littorella, 93
Liverworts, 47
Loasa, 167
Lobelia, 118
Loddigesia, 178
Loeflingia, 160
Logania, 108
Lomentaceæ, 180, 203
Lonicera, 130, 205, 206
Loranthus, 130, 205, 206
Lotus, 178
Louichea, 189
Ludia, 174
Ludwigia, 166
Lunaria, 139
Lupinus, 178
Luridæ, 102, 202, 211
Lychnis, 161
Lycium, 102
Lycopsis, 103
Lycopus, 99
Lysimachia, 95
Lysimachiæ, 95, 201, 202, 205
Lythrum, 171

Maba, 113
Mabea, 185
Macanea, 144
Macrocnemum, 203
Macrolobium, 176, 177
Mæsa, 115
Magnolia, 151
Magnoliæ, 151, 206
Mahernia, 156
Malachodendrum, 150
Malachra, 149
Malcomia, 139
Malope, 149
Malpighia, 143
Malpighiæ, 142, 201
Malus, 172
Malva, 149
Malvaceæ, 146, 148, 156, 183, [203
Malvaviscus, 149
Mammea, 144
Mangifera, 181
Manglilla, 111
Maprounea, 185
Maranta, 79
Marchantia, 64
Marcgravia, 140
Marrubium, 99
Martynia, 106
Massonia, 75
Matayba, 141
Matelea, 109
Matthiola, 128, 140
Matricaria, 123
Mayepea, 183
Mayeta, 170
Mayna, 151
Medeola, 72
Medicago, 178
Meionectes, 167
Melaleuca, 42, 168
Melampyrum, 96
Melanthaceæ, 73
Melastoma, 170
Melastomæ, 169, 201
Melhania, 150
Melia, 146
Meliæ, 111, 114, 146, 150, [201, 208
Melianthus, 158, 159, 202
Melica, 69
Melicocca, 141
Melicope, 158
Melilotus, 178
Melittis, 99
Melochia, 150
Melodinus, 109
Melothria, 186, 187
Membrana, 26
Memecylon, 167, 169
Menisperma, 153, 199

Menispermeæ, 154
Menispermum, 154
Mentha, 99
Mentzelia, 167
Menyanthes, 96, 108
Menziesia, 114, 211
Mercurialis, 185
Mesembryanthemum, 166
Mespilus, 41, 172
Messerschmidia, 103
Mesua, 145
Methonica, 73
Metrosideros, 168, 242
Meum, 34
Michauxia, 118
Michelia, 151
Micropus, 124
Millingtonia, 106
Mimosa, 175, 176, 180
Mimoseæ, 180
Mimulus, 100, 101
Mimusops, 111, 200
Mindium, 118
Minuartia, 161
Mirabilis, 94, 205, 206
Mirbelia, 178
Misandra, 189
Miscellaneæ, 207
Mitchella, 129, 205, 206
Mitella, 164
Mithridatea, 189
Mitrasacme, 107
Mocanera, 166
Modecca, 187
Moehringia, 161
Molinæa, 141
Mollugo, 161
Momordica, 187
Monadelphia, 42
Monandria, 40
Monarda, 99
Monnieria, 168, 202
Monocotyledones, 33, 36, 61-85
Monoecia, 43, 46, 122
Monœcious flowers, 28
Monogamia, 46, 123
Monogynia, 44
Monopetalous flowers, 20, 61
Monsonia, 148
Montia, 165
Montinia, 166
Moquilea, 173
Moræa, 76
Morina, 126, 205, 206
Morinda, 129, 205, 206
Moringa, 175, 177
Morisonia, 140
Moronobea, 144
Morus, 189
Mosses, 46, 64
Mouriria, 167
Mulinum, 133
Mullera, 177
Multisiliquæ, 202
Munchausia, 171
Mungos, 107
Muntingia, 156
Murræa, 145
Murucuia, 187
Musa, 78, 80
Musæ, 77
Musci, 34, 46, 64, 209
Mushrooms, 47
Mussænda, 128
Mutisia, 123
Myginda, 182
Myosotis, 103
Myosurus, 136
Myrica, 182, 190
Myriophyllum, 66, 167
Myristica, 90
Myrmecia, 107
Myrodia, 150
Myrospermum, 180
Myroxylum, 180
Myrrhis, 134
Myrsine, 111
Myrsineæ, 111
Myrti, 167, 168, 201, 203
Myrtus, 168

Naïades, 35, 66, 198, 201, 207

Picrium, 107
Pilocarpus, 158
Pilus, 13
Pimelæa, 87
Pimpinella, 134
Pinguicula, 96, 202
Pinus, 191
Piparea, 157
Piper, 189, 198
Piperitæ, 198
Piriqueta, 157
Piscidia, 179
Pisonia, 94
Pistacia, 181, 206
Pistia, 85, 207, 209
Pistilla, 21
Pistils, 21
Pisum, 42, 179
Plagianthus, 150
Plantagines, 93
Plantago, 93
Platanus, 190
Platylobium, 178
Plectronia, 183
Pleurandra, 152
Plinia, 173
Plukenetia, 185
Plumbagines, 94, 205
Plumbago, 94
Plumeria, 109, 110
Plumula, 24, 69, 80
Poa, 40, 69
Pod, 23
Podalyria, 177
Podocarpus, 191
Podolobium, 178
Podophyllum, 137
Pogonia, 82
Poinciana, 177
Polemonia, 104, 202
Polemonium, 105
Polianthes, 76
Pollen, 21
Pollichia, 242
Polyadelphia, 42
Polyandria, 41
Polycardia, 182
Polycarpon, 161
Polygala, 96
Polygamia, 43, 49
———— *æqualis*, 45, 120, 121
———— *frustranea*, 45, 121, 122
———— *necessaria*, 45, 122
———— *segregata*, 45, 121, 123
———— *superflua*, 45, 122
Polygamous flowers, 28 [216
Polygoneæ, 90, 117, 165, 200
Polygonum, 90, 216
Polygynia, 44
Polymeria, 104
Polypetalous flowers, 20, 61
Polypodium, 66
Polyscias, 132
Pomaceæ, 172, 203
Pomaderris, 183
Pomum, 23, 172
Ponæa, 141
Pontederia, 76
Populus, 43, 190
Poraqueiba, 155
Portesia, 146
Portlandia, 128
Portulaca, 165
Portulaceæ, 164, 200, 208
Possira, 177
Potalia, 108
Potamogeton, 66, 73
Potentilla, 173
Potentillæ, 173
Poterium, 172, 203, 207
Pothos, 67
Pouch, 23
Poupartia, 181
Pourouma, 189
Pouteria, 113
Preciæ, 201
Prickle, 12
Primula, 96
Primulaceæ, 96
Prinos, 182

Prockia, 173
Prockiæ, 173
Procris, 189
Proportion, 41
Proserpinaca, 85, 167
Prosopis, 177
Protea, 88, 205
Proteaceæ, 88, 89, 130, 205
Proteæ, 88
Prunella, 99
Prunus, 173
Pselium, 154
Psidium, 168
Psoralea, 178
Psychotria, 128
Psyllium, 93
Ptelea, 181
Pteranthus, 189
Pteris, 66
Pterocarpus, 179
Pterospermum, 150
Pubescence, 13, 55
Pulmonaria, 103
Pultenæa, 177
Punctuation, 58
Pungamia, 179
Punica, 168, 203
Purshia, 174
Putamineæ, 202
Puya, 74
Pyrola, 115
Pyrus, 172

Quapoya, 144
Quararibea, 150
Quassia, 152
Quercus, 43, 190
Queria, 161
Quisqualis, 167
Quivisia, 146

Racemus, 14
Rachis, 69
Radiant umbel, 15
Radiati, flores, 29
Radicle, 3
Radicula, 3
Radix, 3, 4
Rafnia, 178
Rajania, 72
Randia, 128
Ranunculaceæ, 136, 152, 202
Ranunculus, 136
Rapanea, 155
Raphanus, 139
Rauwolfia, 109
Ravenala, 78
Reaumuria, 166
Receptacle, 27
Receptaculum, 27
Renealmia, 79
Reseda, 41, 140, 207
Restiaceæ, 73
Restio, 73
Rhamneæ, 183
Rhamni, 181, 182, 204, 205
Rhamnus, 183
Rheedia, 145
Rheum, 90
Rhexia, 170
Rhinanthus, 96
Rhizophora, 130, 200
Rhizophoreæ, 130
Rhodiola, 163
Rhododendra, 112, 114, 116, 117, 201, 211
Rhododendrum, 114
Rhodora, 114
Rhoeadeæ, 202
Rhus, 181, 204
Riana, 155
Ribes, 164, 203
Richardia, 127
Ricinus, 185
Ringent flowers, 48
Rinorea, 155
Rittera, 177
Robergia, 181
Robinia, 179
Roella, 118
Rokejeka, 165
Root, 3, 4, 56
Rosa, 172

Rosaceæ, 171, 176, 203, 207
Rosæ, 172
Roscoea, 81
Rosmarinus, 99
Rostrum, 27
Rotaceæ, 201
Rotala, 161, 171
Rottbollia, 69
Roupala, 88
Rourea, 181
Royena, 113
Rubentia, 182
Rubia, 127 [206
Rubiaceæ, 107, 126, 203, 204,
Rudbeckia, 124
Ruellia, 97
Ruizia, 150
Rumex, 96, 216
Rumphia, 181
Ruppia, 66
Ruscus, 72
Ruta, 158 [202, 204, 205
Rutacea, 148, 157, 181, 201,

Sabbatia, 107
Sabicea, 129
Sagina, 161
Sagittaria, 73
Salicariæ, 161, 169, 170, 201
Salicornia, 91
Salix, 43, 190
Salmasia, 157
Salsola, 91
Salvia, 99
Samara, 23, 183
Sambucus, 131, 204
Samolus, 96
Sandoricum, 146
Sanguinaria, 137
Sanguisorba, 172, 203, 207
Sanguisorbæ, 172
Sanicula, 134
Santalaceæ, 87, 111, 167
Santalum, 87, 167
Sapindi, 140, 143, 201
Sapindus, 141
Sapium, 185
Saponaria, 161
Sapotæ, 110
Sarcophyllus, 178
Sarmentaceæ, 199, 208
Sarothra, 161
Sarracenia, 208
Satureia, 99
Satyrium, 82
Saururus, 66, 198
Saxifraga, 163
Saxifragæ, 128, 163, 165, 200
Scabiosa, 40, 126, 205
Scabridæ, 207
Scævola, 118
Scandix, 134
Scapus, 6
Scar, 26
Scheuchzeria, 73
Schinus, 181
Schizandra, 154
Schmidelia, 141
Schotia, 176
Schrankia, 175
Schrebera, 182
Schulzia, 134
Schwalbea, 100
Schwenkia, 100
Scilla, 75
Sciodaphyllum, 132
Scirpus, 68
Scitamineæ, 36, 79, 199
Scleranthus, 165
Sclerothamnus, 178
Scolopendrium, 46
Scoparia, 100
Scopolia, 181
Scorpiurus, 179
Scottia, 178
Scrophularia, 100
Scrophulariæ, 100—102, 203
Scutellaria, 99
Sebæa, 107
Sechium, 185
Securidaca, 180
Securinega, 185

Sedum, 163
Seed-bud, 22
—— down, 27
—— lobes, 24
—— vessels, 22
Seeds, 24
Segregatæ, 50
Selago, 98, 205, 206
Selinum, 133
Semecarpus, 181
Semina, 24
Sempervivæ, 162, 200
Sempervivum, 163
Senecio, 123
Senra, 150
Senticosæ, 203
Separated flowers, 28, 42, 49
Sepiariæ, 204
Septas, 44, 163
Serapias, 82
Seriphium, 123
Serissa, 129
Serpicula, 166, 167
Serratula, 121
Sesamum, 105
Seseli, 134
Sesleria, 69
Sessiles, flores, &c. 7
Sesuvium, 166
Sheath, 19
Sherardia, 127
Sibbaldia, 173
Sibthorpia, 96, 101
Sicku, 242
Sicyos, 187
Sida, 149
Sideroxylum, 111
Siegesbeckia, 120, 124
Silene, 161
Siler, 134
Silicula, 23
Siliculosa, 45, 139
Siliqua, 22
Siliquosa, 45, 139
Siliquosæ, 203
Silphium, 124
Simaba, 181
Sinapis, 139
Singana, 145
Siphonia, 185
Sirium, 167
Sison, 134
Sisyrinchium, 76
Sium, 134
Sloanea, 156, 206
Smilax, 72
Smithia, 179
Smyrnium, 134
Sodada, 140
Solandra, 149, 212
Solaneæ, 101, 202, 203
Solanum, 102
Sonchus, 120
Sonneratia, 168
Sophora, 177
Sorbus, 172
Sori, 19, 65
Sowerbæa, 74, 75
Spananthe, 134
Sparganium, 68, 198
Sparmannia, 156
Spartium, 42, 178
Spatha, 19
Spathaceæ, 199
Spathelia, 181
Spathodea, 106
Species, 30, 52
Specific characters, 53—59
Spergula, 161
Spermacoce, 127
Sphærolobium, 178
Sphagnum, 65
Spica, 14
Spicula, 14
Spigelia, 107
Spike, 14
Spikelet, 14
Spilanthus, 124
Spina, 12
Spinachia, 91
Spiræa, 173
Spirææ, 173

Spirospermum, 154
Spondias, 181
Stachys, 99
Stæhelina, 120
Stalks, 6, 7
Stamens, 21
Stamina, 21
Standard, 175
Stapelia, 109, 110
Staphylea, 182
Statice, 94, 205
Stauntonia, 154
Stellaria, 161
Stellatæ, 204
Stems, 5, 6, 56
Sterbeckia, 145
Sterculia, 150
Sterilis, flos, 28
Stigma, 22
Stillingia, 185
Stipes, 8
Stipula, 11
Stoebe, 123
Stone fruit, 23
Stratiotes, 85, 198
Stravadium, 169
Straw, 6
Strelitzia, 78
Strigilia, 146
Strobilus, 24, 190
Strophiolum, 26
Structure, 32
Struthiola, 87
Strychnos, 109
Stuartia, 42, 146, 150, 156
Stylideæ, 118
Stylidium, 42
Stylus, 22
Styrax, 113
Succulentæ, 200
Suriana, 173
Sutherlandia, 179
Swainsonia, 179
Swertia, 107
Swietenia, 147, 208
Symphonia, 144, 146
Symphoricarpos, 130
Symphytum, 103
Symplocos, 113
Syngenesia, 42, 120—124
Syringa, 97

Tabernæmontana, 109
Tacca, 76, 86
Tachia, 107
Tachibota, 157
Tachigalia, 177
Tacsonia, 187
Tagetes, 123
Tail, 27
Talauma, 151
Talinum, 165
Talisia, 141
Tamarindus, 176
Tamarix, 165
Tamus, 72
Tanacetum, 124
Tapiria, 181
Taralea, 177
Tarchonanthus, 124
Tasmannia, 151
Taxus, 191
Tecoma, 106
Tectona, 98
Teesdalia, 41, 139
Telephium, 165, 208
Templetonia, 178
Tendril, 12
Tenoria, 134
Terebintaceæ, 180, 206
Terebinthus, 181
Terminalia, 86, 167
Ternstromia, 146
Testa, 26
Tetracera, 152, 173, 174
Tetradynamia, 41, 139
Tetragonia, 166
Tetragynia, 44
Tetrandria, 40
Tetranthera, 90
Teucrium, 99
Thalia, 79

Thalictrum, 136
Thapsia, 134
Thea, 146, 203
Theka, 98
Thelygonum, 189
Thelymitra, 82
Theobroma, 150
Theophrasta, 109
Thermopsis, 177
Thesium, 86, 87
Thlaspi, 41, 139
Thoa, 189
Thorn, 12
Throat of a flower, 20
Thryallis, 142
Thuya, 191
Thymelææ, 87, 203
Thymus, 99
Thyrsus, 16
Tiarella, 163
Tibouchina, 170
Ticorea, 146, 158
Tigarea, 152, 173, 174
Tigridia, 76
Tilia, 156
Tiliaceæ, 155, 206
Tillæa, 163
Tillandsia, 74
Tinus, 146, 200
Tococa, 170
Toluifera, 181
Tonabea, 146
Topobea, 170
Tordylium, 133
Torilis, 134
Tormentilla, 173
Toulicia, 141
Tournefortia, 103
Tourretia, 106
Tovomita, 144
Tozzia, 96
Trachelium, 118
Tradescantia, 73
Tragia, 185
Tragium, 134
Tragopogon, 120
Trapa 85
Triandria, 40
Trianthema, 165
Tribulus, 158
Trichilia, 146
Trichodesma, 103
Trichosanthes, 187, 188
Tricoccæ, 203
Tricratus, 94
Tridax, 124
Trifolium, 178
Triglochin, 73
Trigonella, 178
Trigonia, 143
Trigonis, 141
Trigynia, 44
Trihilatæ, 201
Trioecia, 46
Triopteris, 142
Triosteum, 130, 205, 206
Tripetaloideæ, 198
Tristania, 169
Tristemma, 170
Triticum, 69
Triumfetta, 156
Trollius, 136
Tropæolum, 148, 159, 201
Trophis, 207
Tubular florets, 28
Tubus, 20
Tuft, 15
Tulbaghia, 75
Tulipa, 73
Tunic, 27
Turnera, 157, 165
Turræa, 146, 150, 208
Tussilago, 120, 123
Typha, 68, 198
Typhæ, 67

Ulex, 42, 178
Ulmus, 190, 207
Umbel, 15, 132
Umbella, 15
Umbellatæ, 204
Umbelliferæ, 15, 18, 56, 132, [204

Umbellula, 15, 132
Unguis, 20
United flower, 28
Unona, 153
Urania, 78
Urena, 149
Urtica, 189
Urticæ, 188, 198, 207
Utricularia, 96, 202
Utriculus, 23
Uvaria, 153
Uvularia, 73

Vaccinium, 112, 115, 211, 216
Vahlia, 166
Valantia, 127
Valeriana, 126, 205
Valisneria, 85, 198
Vanilla, 82, 84
Varieties, 30, 52
Varronia, 103
Vateria, 145
Vatica, 145
Vegetation, 4, 24
Veil, 65
Velezia, 161
Vella, 139
Velleia, 118
Ventilago, 183
Vepreculæ, 203
Veratrum, 73
Verbascum, 101, 102
Verbena, 98, 206
Verbenaceæ, 99
Verbesina, 124
Veronica, 40, 96, 100
Verticillatæ, 99, 204, 211
Verticillus, 14
Vexillum, 175
Viburnum, 130, 131, 204
Vicia, 179
Villarsia, 108
Viminaria, 178
Vinca, 109, 110
Viola, 135, 157, 202
Virecta, 128
Virgilia, 177
Viscum, 130, 205, 206
Vismea, 166
Vitellus, 25, 80
Vites, 147
Vitex, 98
Vitices, 98, 130, 203, 206
Vitis, 147, 204
Vohiria, 107
Volva, 19, 63
Votomita, 183
Vouapa, 177

Wachendorfia, 77
Wahlbomia, 152
Waltheria, 156
Watsonia, 76
Weinmannia, 164
Westringia, 100
White of a seed, 25
Whorl, 14
Wiborgia, 178
Willughbeja, 109
Wilsonia, 104
Wing, 27
Wings, 175
Wintera, 151
Winterania, 146
Witheringia, 102
Witsenia, 76
Wormia, 152
Wrapper, 19
Wulfenia, 100

Xanthe, 144
Xanthium, 122
Xanthorrhiza, 137
Xanthoxylon, 158, 181, 204
Xeranthemum, 123
Xerophyta, 74
Ximenia, 145
Xiphidium, 76
Xylopia, 153
Xylophylla, 185
Xylosteum, 130
Xyris, 73

Yolk, 25
Yucca, 73

Zamia, 198
Zannichellia, 66
Zanonia, 187
Zea, 69
Zieria, 158
Zingiber, 81
Ziziphus, 183
Zostera, 67, 198
Zucca, 188
Zwingera, 181
Zygia, 180
Zygophylleæ, 159
Zygophyllum, 158

◆

BODLEIANA

ADDITIONS AND CORRECTIONS.

Page 24, after line 10th, add, A pulpy fruit, still further from the nature of a real pericarp, is formed of a branched common-flowerstalk in *Hovenia dulcis, Thunb. Jap.* 101, *Sicku* of Kæmpfer's *Amœnitates Exoticæ* 808. *t.* 809; and of the same part perhaps, rather than the scales of a receptacle, in *Pollichia campestris, Ait. Hort. Kew. v.* 1. 12. *Smith Spicil.* 1. *t.* 1. The latter is a very curious genus, of the *Monandria Monogynia*, belonging to Mr. Brown's *Illecebreæ*, see p. 93, where it should stand next to *Herniaria.*

Page 76, l. 6, read *Polianthes.*

109, l. 22, read *Anasser.*

168, l. 3 from the bottom, before *Leptospermum* insert *Metrosideros, Sm. Tr. of Linn. Soc. v.* 3. 266.